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AMERICAN GAS JOURNAL

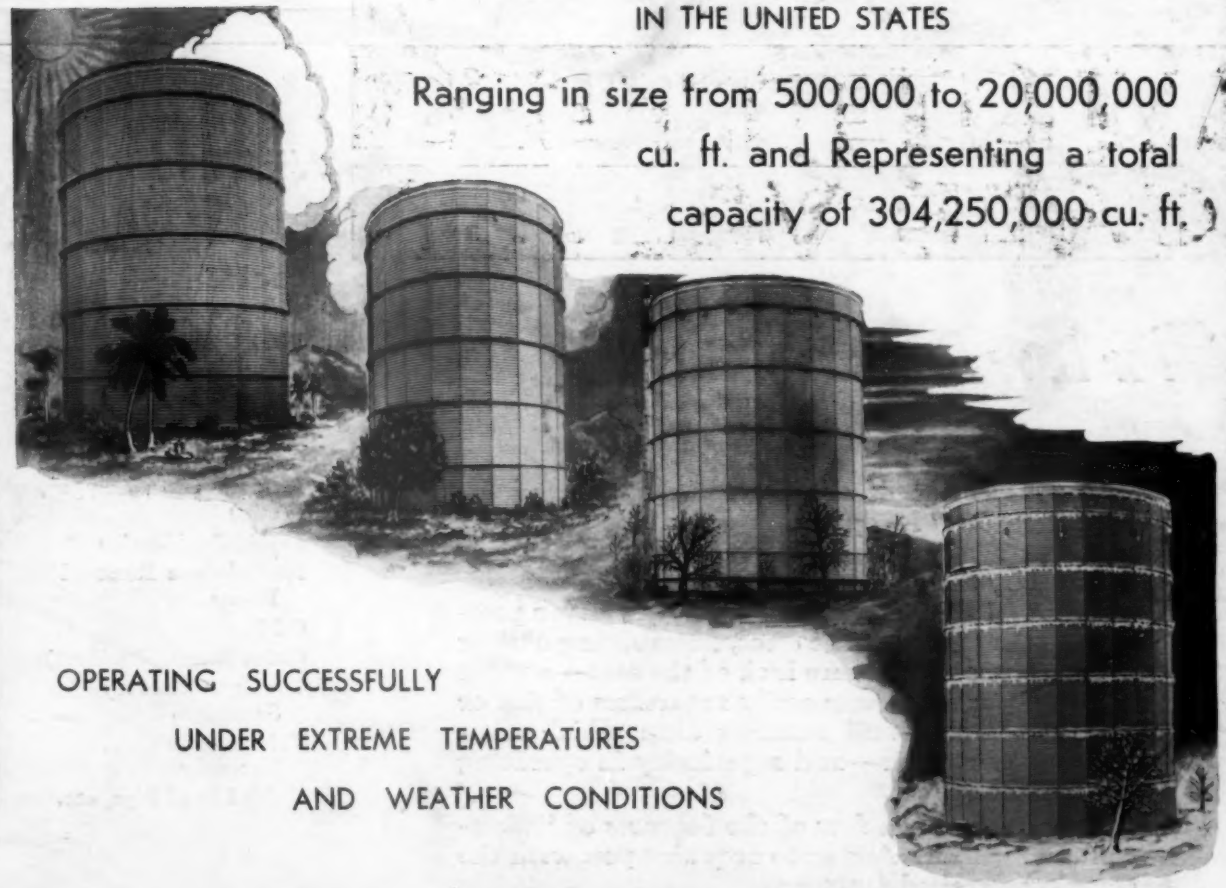
Established 1855 Pioneer of the Gas Industry

Manufactured and Natural Gas

47 WATERLESS GAS HOLDERS

IN THE UNITED STATES

Ranging in size from 500,000 to 20,000,000 cu. ft. and Representing a total capacity of 304,250,000 cu. ft.

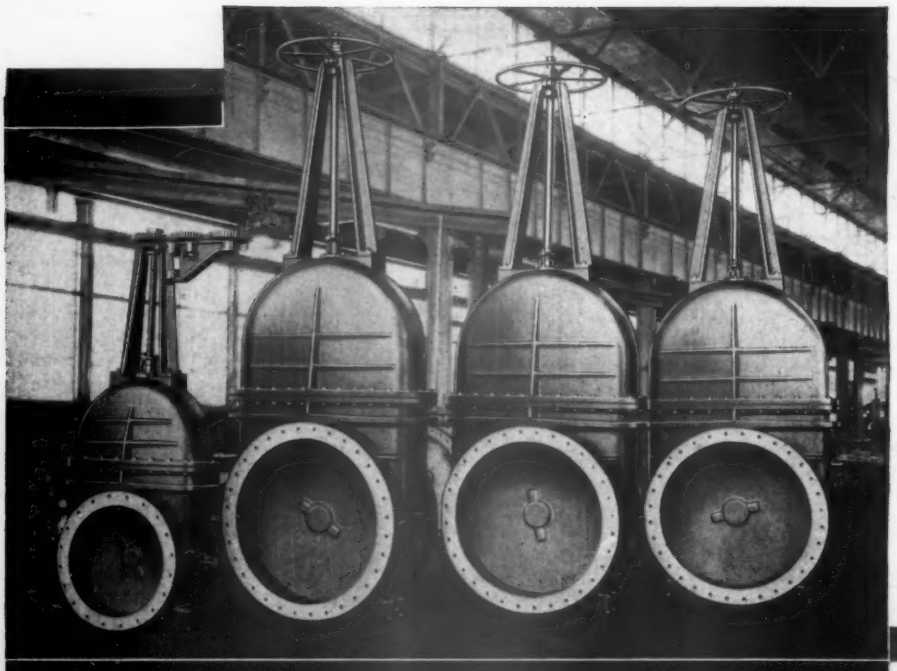


OPERATING SUCCESSFULLY
UNDER EXTREME TEMPERATURES
AND WEATHER CONDITIONS

Coal Gas Plants
Carburetted Water Gas Plants
Blue Water Gas Plants
By-Product Plants
DeBrouwer Charging and Discharging Machines
Salt Water and Fresh Water Condensers
Tar Extractors
Gas Holders

THE BARTLETT HAYWARD COMPANY
Baltimore / New York

Purifiers
B. H. Co. Vertical Centrifugal Scrubbers (Feld Type)
B. H. Co. Thickener (Center Type)
Steel Tanks
Vertical Waste Heat Boilers
B. H. Co. Westling Valve
Faut's Flexible Couplings



A Dependable Valve of Rugged Construction

WESTERN GAS GATE VALVES

For Low Pressure Gas, Air or Water Service

An inspection of the inner mechanism of the "Western Gas" low pressure gate valve reveals its inherent advantages—a positive closing pressure effected by the double lever action of the two gibs acting against the bottom cone applying even pressure to the center of the discs, distributing closing pressure to every square inch of the seat—a valve which opens and closes easily regardless of size or line conditions—full rotating discs which eliminate uneven wear—and superiority in operating dependability.

These are only a few of the features of "Western Gas" valves. Ask us to acquaint you with the complete detailed facts.

WESTERN GAS designs and builds –

- ABC Generator Grates
- Blue Water Gas Plants
- Blast Gates
- Carburetted Water Gas Plants
- Condensing Apparatus
- Gas Dehydration Plants
- Holders (Gas, Oxygen, etc.)
- Liquid Purification
- Naphthalene Removal Plants
- Oil Foggers
- Oxide Boxes (Purifiers)
- Tower and Rotary Scrubbers
- Valves, Gate and Butterfly
- Welded Steel Pipe, etc.

The Western Gas Construction Co.

SUBSIDIARY OF THE BARTLETT HAYWARD CO.

FORT WAYNE, INDIANA E. PONTIAC STREET

AMERICAN
GAS JOURNAL
Established 1859 *Pioneer of the Gas Industry*

Manufactured and Natural Gas

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S. G. KRAKE, *President and Treasurer* A. M. GLEASON, *Secretary*

H. M. RILEY, *Editor*

R. S. McBRIDE, *Consulting Editor*, Washington, D. C.

Vol. 134, No. 2 February, 1931 Whole Number 3686

TABLE OF CONTENTS

A Good Investment 31
Have You Made Your Winter Pressure Survey? 32
Safety Instruction Never Goes Too Far 32
Availability of Information 32
Service as Usual 33
Industrial Furnaces for Gas—Lawrence E. Biemiller 34
Why Manual Control? J. Lyle Vance ... 37
The Complete Classification of Coal—Dr. R. Mezger and Dr. T. Payer 39
Coke Oven Operation and Maintenance—F. J. Pfluke 41
Method of Laying Gas Mains Through Embankments 45
Ensuring Profits by Sound Rate Schedules—R. S. McBride 47
Some Factors That Affect Rates—Everett S. Buck 49
Thermal Standards of Measurement for Town's Gas—R. D. Keillor 50
The Relation of Humidity and Temperature to Comfort—W. E. Stark 53
Mixed Gases and the Appliance Manufacturer—Albert F. Craver 56
Annual Meeting of New England Gas Association 59
American Gas Merchandising Almanack 67
A City Wide Clean-Up Campaign 68
Here's How 70
Ten Weeks Cooking School a Success Without Prizes—Rodger K. Tenney.. 71
Big 66 Round Up Sale of Hot Water Heaters—W. B. Stoddard 72
Equipment News 74
News of the Gas Industry 77
Personals 84
Trade News 88

INDEX TO ADVERTISERS PAGE 109

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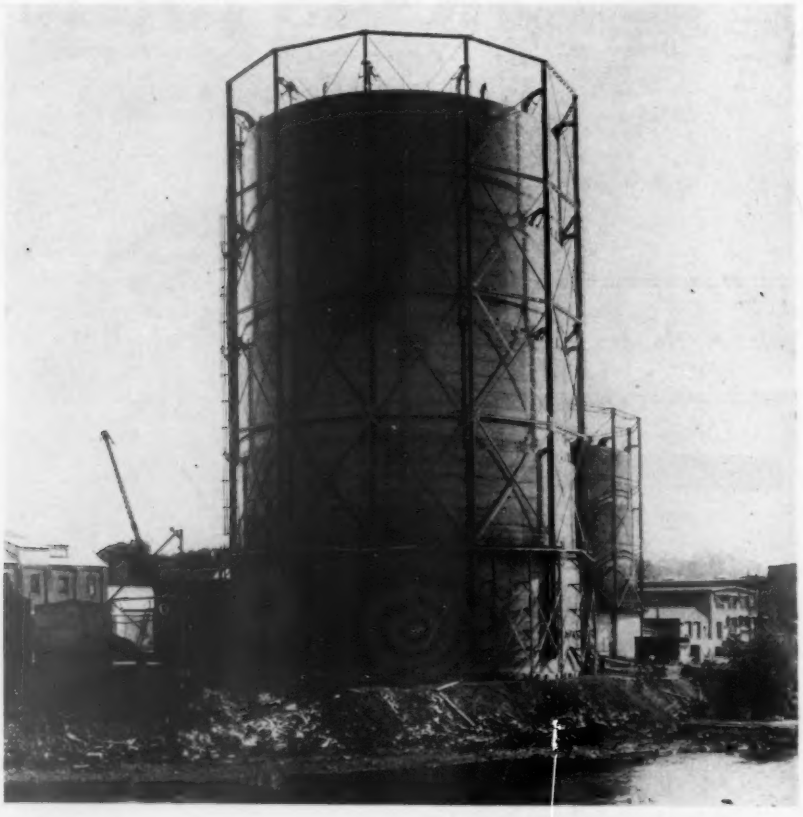
53 Park Place, New York

The Builders of Stacey Holders for Over 80 Years



Gas holders of correct design and construction

where ground space is limited

So long and varied has been our experience in supplying gas companies with storage facilities to meet their requirements that we can point to many examples of holders erected on limited ground area. One example is this one-million cubic foot, four-lift holder with a diameter of 105 feet.

Like all equipment built by The Stacey Manufacturing Company, this holder is correct in both design and construction. It was designed by engineers who have specialized for many years in this type of work.

The Stacey Manufacturing Company is equipped to design and build *low pressure holders* of all capacities including 15,000,000 cubic feet; also *high pressure holders*, either riveted or welded construction, for working pressures up to and including 100 pounds; *steel plate construction* for various uses in the gas, oil and chemical industries; *purifiers* either riveted or welded, elevated or at ground level.

We shall be glad to discuss your requirements at any time.

An independent organization not affiliated with any other builders of gas holders

THE STACEY MANUFACTURING CO.

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SINCE 1851

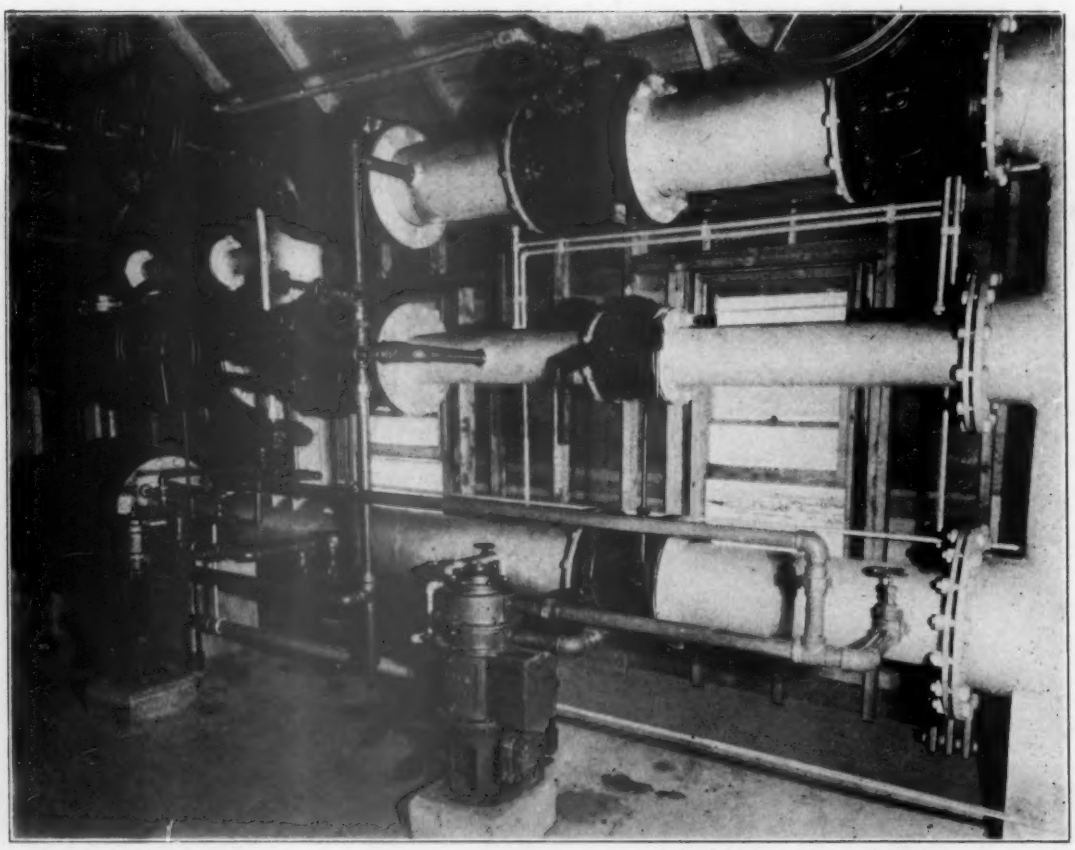
PROFIT BY RECOVERY OF PHENOL

IN many by-product plants, phenol can be recovered on a cost basis justifying an installation of the highly economical Semet-Solvay unit, designed for this purpose.

We are prepared to equip your plant with a phenol recovery installation that will be independent of other by-product recovery apparatus. Operating costs are attractively low. No additions to plant personnel are necessary.

Your request for a survey and proposal will bring full information without obligating you in any way. An installation now will enable you to capitalize on the developing markets for this useful product.

SEMET-SOLVAY
ENGINEERING CORPORATION
Division Allied Chemical and Dye Corp.
40 RECTOR ST. NEW YORK



Smoot Control of Gas Mixing

A Smoot Gas Mixer is being installed by the Laclede Gas Co., St. Louis, Mo. to mix 170,000 cu. ft. of producer gas per hour with 75,000 cu. ft. of oil gas per hour.

The Smoot Gas Mixer mixes the gases volumetrically and compensates immediately for changes of gas flow or pressure. The equipment is mechanical and is fast acting and free from hunting.

Smoot Engineering Corp., 136 Liberty St., New York

SMOOT CONTROL

REPORTING THE FINEST
KIND OF PROGRESS
February finds the work of designing and building Pennsylvania's largest Gas Holder well under way.
But far more important is the fact that, notwithstanding swift and steady progress, each step is being taken with characteristic Cruse - Kemper thoroughness.
The manufacture is being done entirely by Cruse - Kemper in order to assure the upholding of our standard of workmanship.

CRUSE-KEMPER CO.

AMBLER, PA.

Manufacturers of GAS HOLDERS and other major equipment units for the GAS INDUSTRY

In 1931 . . . . . .

Baltimore *specifies*

Today, transcontinental motor busses speed over smooth-surfaced modern highways to meet present-day transportation needs. A great advance from the hazardous, creaking stage coach of a by-gone pioneer period.

As transportation has advanced, so has the gas industry. Yet, it is interesting to note that today's high standards of gas main efficiency are being met by cast iron mains laid away back in the days of the old stage coach. In Baltimore, in Boston, in Memphis and many other cities, the original cast iron gas mains are still in service, still young and strong, meeting the exacting demands of 1931.

No wonder that engineers today are specifying *modern* cast iron gas mains to meet modern conditions. For the cast iron pipe being produced today is naturally higher in quality than that of a century ago.

. . . . . *as in* 1834

Cast Iron Gas Mains

Today's cast iron gas pipe is scientifically produced to meet specifications much more exacting than those of 50 or more years ago. Today's cast iron pipe has a high degree of uniformity in quality resulting from modern laboratory control and present-day testing and inspection methods.

Engineers, contractors and city officials desiring information on the advantages of specifying cast iron pipe for gas, water, sewers, road culverts or for industrial needs are invited to write to Thomas F. Wolfe, Research Engineer, The Cast Iron Pipe Research Association, 309 Peoples Gas Building, Chicago, Illinois.

Efficient mechanical joints for cast iron gas mains are now in use and obtainable for high-pressure gas distribution.

Cast iron pipe bearing the "Q-check" trademark is obtainable from the following leading pipe founders: Alabama Pipe Company, Anniston, Ala.; American Cast Iron Pipe Company, Birmingham, Ala.; James B. Clow & Sons, 219 N. Talman Avenue, Chicago, Ill.; Donaldson Iron Company, Emaus, Pa.; Glamorgan Pipe and Foundry Company, Lynchburg, Va.; Lynchburg Foundry Company, Lynchburg, Va.; National Cast Iron Pipe Company, Birmingham, Ala.; United States Pipe and Foundry Company, Burlington, N. J.; Warren Foundry and Pipe Company, 11 Broadway, New York.

Reg. Trade Mark

CAST Q IRON

The "Q-check" symbol shown above has been as the trade mark of The Cast Iron Pipe Research Association.

CAST IRON PIPE

A NEW

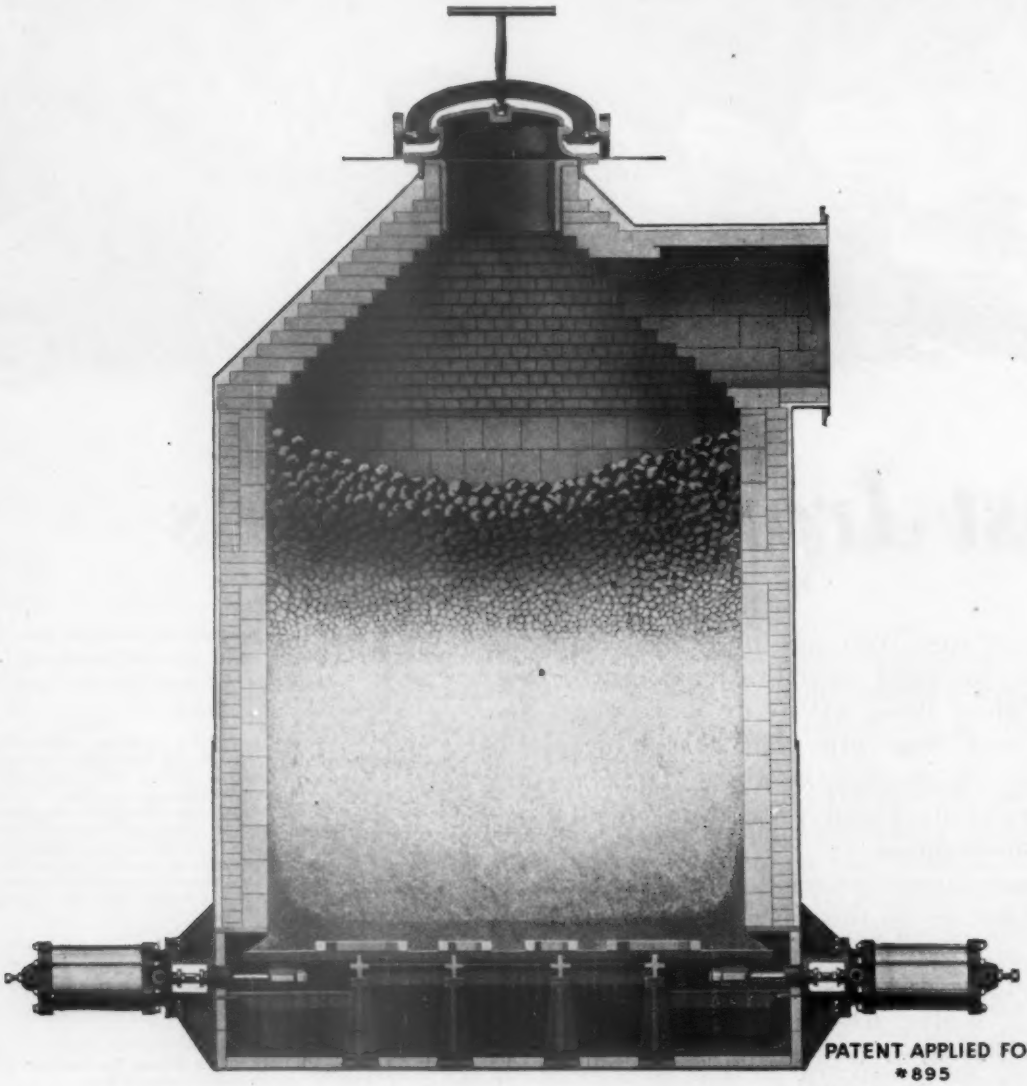
MECHANICAL GRATE

For Large or Small Sets

Simple in Design *Rugged in Construction*

Low Initial Cost

A PROVEN SUCCESS!

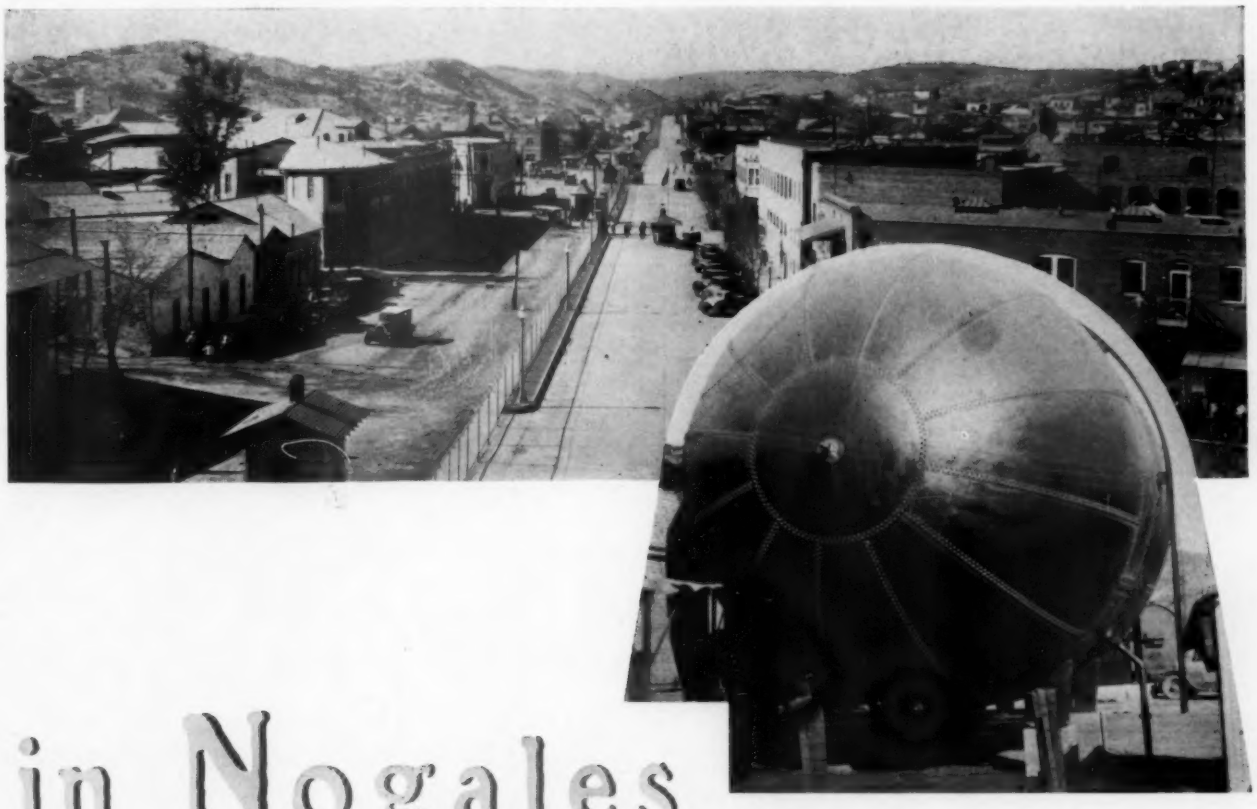


We will be pleased to explain this grate

BUILT BY

THE GAS MACHINERY COMPANY

1900 Euclid Avenue, Cleveland, Ohio



in Nogales

Nogales, Arizona probably always will be "on the fence" on one question, for on the left we see "wet" Nogales, Sonora, Mexico, and on the right of the International Boundry Line fence, "dry" Nogales, Arizona, U. S. A.

But Nogales is not "on the fence" when it comes to demanding the best in high pressure gas holders, as the Stacey "Bullet" installation proves.

Stacey "Bullets" for high pressure gas storage are built right — *permanently tight!* There are so many points of superior construction on the Stacey "Bullet" that it will pay you to write for our *Bulletin* 32 which goes into more detail.

Your copy is ready.

(Holder Division of The Stacey Engineering Company)

STACEY BROTHERS
GAS CONSTRUCTION CO.
5535 CARTHAGE PIKE
CINCINNATI, OHIO

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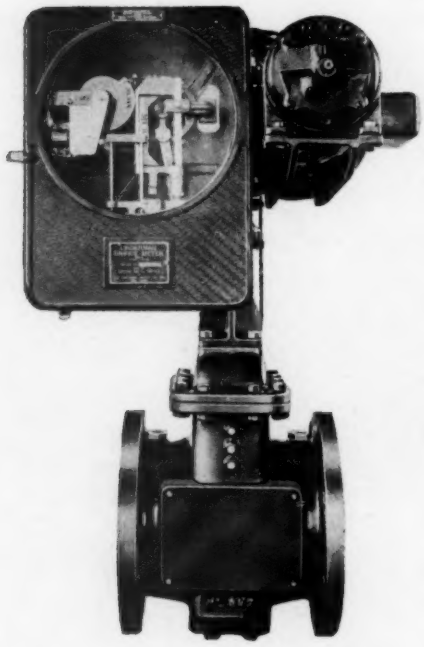
Chicago, Illinois

420 Lexington Avenue
New York City

235 Montgomery Street
San Francisco



ZERO
TO
CAPACITY
Under Varying Conditions

MEASURED AND RECORDED ACCURATELY AND ECONOMICALLY WITHOUT A SINGLE CALCULATION

WITH precision and economy, the Linderman Orifice Meter measures all quantities of gas, from zero to capacity. Complicated calculations are eliminated by automatic compensation for variations in temperature, pressure, rate of flow, and specific gravity.

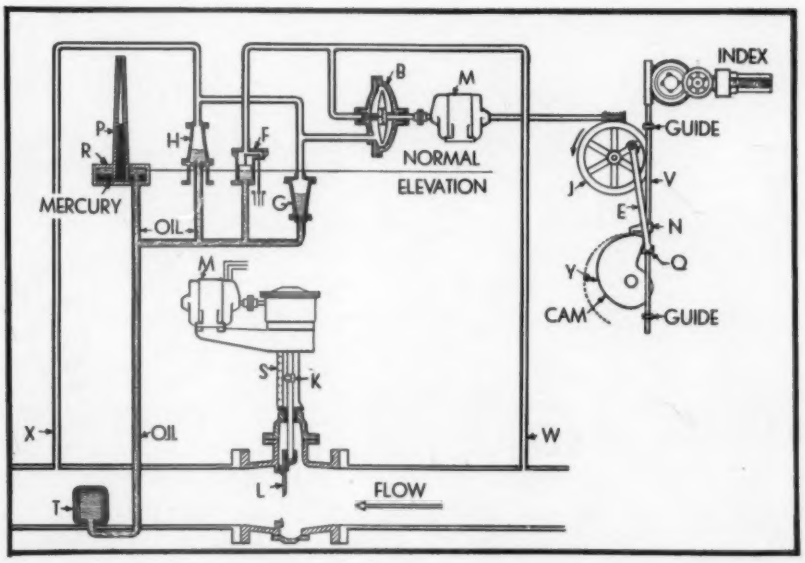
The gas measured is registered on a straight reading index. In addition, an easily read, permanent record of flow is indicated on daily or weekly charts. As a result, peak and off load reports are always at hand to aid in analyses of consumption and distribution.

The Linderman Orifice Meter is only about twice the size of a gate valve of the same capacity. With the exception of its controller, the meter is assembled as a single unit. Its compact construction insures operating efficiency in a minimum space.

A completely equipped experimental and inspection laboratory is maintained at the Metric Metal Works factory of American Meter Company. Here and in the field, engineers constantly study the most practical methods of gas measurement.

Four years of laboratory and field research preceded the introduction of the Linderman Orifice Meter. Many experimental models were observed and checked under various actual operating conditions before the present style was perfected and placed on the market. This has resulted in a highly developed instrument of unusual accuracy.

For gas companies and manufacturing plants, the Linderman Orifice Meter has solved many problems.



The Linderman Orifice Meter Compensates Automatically

See Description Below

Information regarding any phase of large volume gas measurement will be furnished upon request. The construction and operation of the Linderman Orifice Meter is described in detail by catalog LG-1, recently issued. Write for it.

The Linderman Orifice Meter Compensates Automatically

Automatic compensation is effected in this manner. The valve L—actuated by the difference in elevation of the surfaces of low volatility oil in cups H and F—maintains a normal differential. Mercury in the tube P compensates pressure changes. Blower B compensates variations in specific gravity. Oil in chamber T compensates temperature changes. Cam Y and blower B compensate for possible variations in the speed of motor M. These actions are fully explained in catalog LG-1.

Sizes and *Capacities

Pipe Size	High Pressure More than 15 lbs.	Low Pressure Less than 15 lbs.
6"	0 to 150,000	0 to 45,000
8"	0 to 290,000	0 to 90,000
12"	0 to 640,000	0 to 200,000
16"	0 to 1,250,000	0 to 350,000
22"	0 to 3,000,000	0 to 800,000
30"	0 to 4,000,000	0 to 1,250,000

*The above capacities are in standard cubic feet per hour.

AMERICAN METER COMPANY
INCORPORATED
The World's Largest Manufacturers of Gas Meters and Allied Apparatus
ESTABLISHED 1836
GENERAL OFFICES : 105 W. 40TH STREET · NEW YORK, N.Y.

AMERICAN METER CO. MEASUREMENT ENGINEERS CUBIC FEET

SALES · ERIE · DALLAS · TULSA · DENVER · LOS ANGELES · SAN FRANCISCO · KANSAS CITY
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A MOST REMARKABLE RECORD

REPUBLIC
ELECTRIC WELD
MADE BY A NEW PROCESS CONTROLLED EXCLUSIVELY BY REPUBLIC STEEL CORPORATION YOUNGSTOWN OHIO
PIPE

IN EVERY KIND OF COUNTRY

During the past twelve months more than three thousand miles of Republic Electric Weld Pipe have been placed in line pipe service.

In every kind of country—up hill and down dale in the rugged mountains and canyons of Texas—through swamps, rivers, forests—and across mile after mile of scrub covered flat lands.

Without a single claim from any customer.

Without a single rejection.

And without a single complaint.

A most remarkable record for a new product in such severe service. And the most exacting pipe buyer in the world will ask no more than these simple published facts.

REPUBLIC STEEL
CORPORATION
GENERAL OFFICES: YOUNGSTOWN, OHIO

BUTANE
FORGED AHEAD IN 1930

Due to the peculiar psychology of the times, many industries marked time during 1930. Not so with Butane, for as progressive companies scrutinized operations more closely, more apparent became the advantages of G-4 Philfuel (Butane) for:

1. Better and more economical gas enrichment
2. More flexible and more economical peak load control
3. New and converted Philfuels Process city gas plants

We are not boasting. We merely wish to emphasize the point that there are good reasons for the great increase in the use of Butane during 1930.

We will appreciate an opportunity to explain how Butane can earn money for you in 1931.

Gas Manufacturing Division

« PHILFUELS COMPANY »

(Subsidiary of Phillips Petroleum Company)

7-101 GENERAL MOTORS BLDG. DETROIT, MICH.

AND THERE ARE REASONS FOR IT

No. 2 and No. 3 SPRAGUE METERS

for

House Heating Jobs

Accurate Pilot Measurement
Accurate Volume Measurement

Satisfactory
Maintenance cost, first cost, and general results in Manufactured or Natural Gases, High or Low Pressure

THE BIG RUSH is on!

We can take care of you promptly

SPRAGUE METER CO.

BRIDGEPORT, CONN.

"COLONIAL"

This trade-mark stamped on each New Zealand Lamb skin, is our guarantee to you that each skin has received the greatest care in its selection and tanning.

RE-CHROME and OILED METER LEATHERS

For General Use in Tin Meters and Governors

RE-CHROME—RE-OILED LEATHER

Especially Prepared for Iron Meters

"Colonial" Re-Chrome has many proven advantages over bark-tanned leather, and is the most satisfactory and the best leather for use in Diaphragms in New Meters and Repair Work.

1 Longer years service, hence less repairs.

2 More impervious to water. Will stand a five minute boiling test.

3 Greater resistance to heat and climatic conditions.

BESSE, OSBORN & ODELL, INC.

51 SOUTH STREET · BOSTON, MASS.

W. A. Smith—G. Norman Bankart, Representatives 177 William St., New York

METER LEATHERS

Brown Model 801
Indicating Automatic Controller

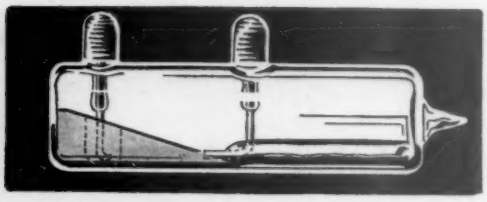
Operated Through Mercury Switches

No Relays Required

For Use With Either Fuel-Fired or Electric Furnaces, Ovens, Kilns, etc.

A New Indicating Temperature Controller

for Speedy, Low-Cost Operation of Heating Processes



There are no open contacts in the new Brown Indicating Control Pyrometer. Circuits are made and broken in gas-tight glass chambers by means of mercury switches, one of which is shown above. These switches will handle currents up to 30 amperes at 110 volts, or 15 amperes at 220 volts, making relays unnecessary for most applications. Even in inflammable or explosive atmospheres this new Brown Indicating Controller can be safely used.

Temperature control is important to profits in thousands of applications. That is why great care should be employed in its selection. The new Brown Model 801 Indicating Control Pyrometer can be relied on to measure accurately temperatures up to 3,000°F. It will control within close limits the temperature in either fuel-fired or electric furnaces, ovens, kilns, etc. You can depend on it to stand up under shop conditions. And it is so designed that adjustment of the control setting, or exposure of the working parts for inspection, is extremely simple. Built for safe, positive, lasting service. *Write for details.*

THE BROWN INSTRUMENT COMPANY
4473 Wayne Ave., Philadelphia, Pa.
Branches in 22 principal cities

Brown Automatic Controls

To Measure is to Economize

The Base of KROMEPATCH is—

Chrome Ore

CHROME ORE belongs to the Spinel Group of Minerals. It is opaque; crystalline in structure, and brownish black to iron black in color.

The distinctive advantages of Chrome Ore are: —High Fusion Point, Chemical Neutrality and Structural Strength. Chrome Ore when properly prepared is one of the very finest and most useful refractory materials known.

"KROMEPATCH" is Chrome Ore, properly prepared to meet the widest variety of furnace conditions.

KROMEPATCH — The Multi-Bond Refractory Cement—is shipped DRY in steel containers holding 200 pounds each. It develops a strong bond at all temperatures without fluxing; has a high hot load strength; does not crumble or squeeze out of the joint, and may be troweled, dipped, sprayed or poured.

Because it is so neutral chemically KROMEPATCH is used for laying Chrome, Silica, Diaspore or Fire Clay Brick. KROMEPATCH is an excellent coating material. Brushed or sprayed on walls it greatly retards penetration of corrosive gases and fluxes.

Write for Bulletin 1-17-16

KROMEPATCH is also a most effective bonding cement to use with ground brick bats or other granular materials for patching and monolithic construction.

"Distributors in Principal Cities"

E. J. LAVINO AND COMPANY
REFRACTORIES DIVISION
CHROME, MAGNESITE AND SILICA REFRACTORIES
BULLITT BUILDING PHILADELPHIA

Pioneers in Chrome Refractories

CHROME ORE

Tycos Pressure Control Will Increase Producer Efficiency

>>

Saves Fuel and Labor

>>

The Tycos Pressure Regulator

FOR a given grade of coal there is one pressure at which the gas producer operates with maximum efficiency.

A Tycos Pressure Regulator on the steam inlet to the turbine-driven blower will regulate the turbine speed and in turn control the air pressure to the fuel bed.

Tycos control has been found ideal for the application. It insures an even, steady and easily regulated flow of air and steam to the producer.

This Tycos Installation has been found to save fuel due to the greater efficiency of operation made possible . . . Labor required for manual regulation is released to other uses . . . and a constant supply of high quality gas can be maintained.

Anemometers
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Dipping Needles
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Draft Gauges
Gas Main Thermometers
Gas Leak Indicators
Hydrometers
Industrial Thermometers
Pressure and Vacuum Gauges
Pyrometers
Recording Thermometers
Regulators, Temperature
Regulators, Pressure
Water Line Thermometers

Tear out this page, write your name and address on the margin and mail it to us for a copy of Catalog 600, Tycos Instruments for Gas-Plants.

Taylor Instrument Companies

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DRESSER

During the last half-century, Dressers have progressed with your Industry—and your Industry has progressed with Dressers. Over 100,000 miles of Dresser Coupled pipe lines have been laid. Today's construction of strong, flexible, *permanently tight* joints centers inevitably in Dressers.

S. R. DRESSER MANUFACTURING CO.
Bradford, Pennsylvania

COUPLINGS DOMINATE

• • • • • • TO PRODUCE DEPENDABLE WELDS

IN welding gas and oil pipe lines selection of materials and instruction in correct welding technique are important factors of good welding practice . . . Under Linde Procedure Control careful and studied selection of materials and application of proven methods make oxwelded joints as strong as the pipe and permanently leakproof — 100 per cent efficient.

THE LINDE AIR PRODUCTS COMPANY

Unit of Union Carbide and Carbon Corporation

126 Producing Plants UCC 627 Warehouse Stores

IN CANADA, DOMINION OXYGEN COMPANY, LTD., TORONTO

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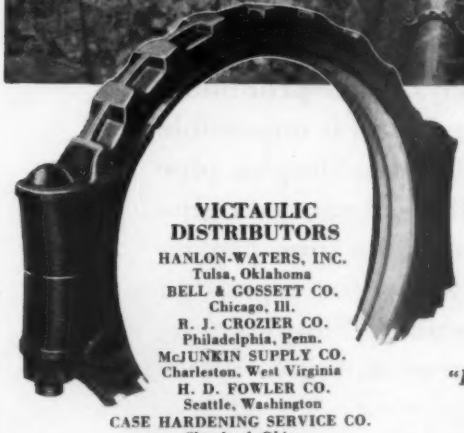
Cincinnati	Milwaukee	San Francisco
Cleveland	Minneapolis	Seattle
Denver		Tulsa

LINDE OXYGEN • PREST-O-LITE ACETYLENE • OXWELD APPARATUS AND SUPPLIES • UNION CARBIDE

"For every joint on the line"



Over the top with Victaulic

In the mountainous country of West Virginia, this natural gas line of the South Penn Oil Company was installed Victaulic-coupled throughout. Six miles of pipe that is standing the "gaff" and is adding a saving in upkeep to the saving in time and labor of installation.

* * *

Victaulic Couplings are available in all sizes from ¾" up for vacuum and pressure—for steel, wrought iron and cast iron pipe. Mail coupon below for descriptive bulletin.

VICTAULIC COMPANY OF AMERICA
26 Broadway New York

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HANLON-WATERS, INC.
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McJUNKIN SUPPLY CO.
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CASE HARDENING SERVICE CO.
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DUCOMMUN CORPORATION
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INDUSTRIAL SUPPLY CO.
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PITTSBURGH SUPPLY CO.
Pittsburgh, Penn.
MERRITT M. STONE CO.
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Monterrey, N. L. Mexico
D. B. McWILLIAMS
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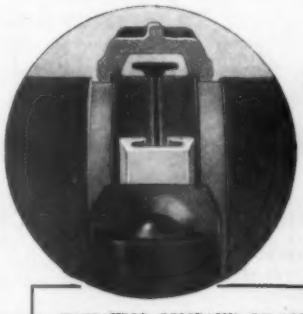
"For every joint on the line"



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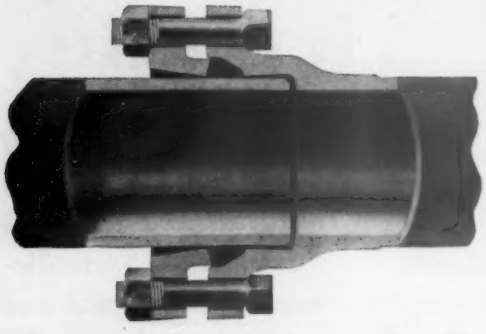

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Friction grip of gasket against surfaces of pipe creates a tight joint against separation and leakage even at extreme high pressures.

This Doublex Simplex test line was subjected to 200 pounds natural gas pressure for 10 days. No leaks!

ALTHOUGH the lightest weight Doublex Simplex Cast Iron Pipe is rated at 150 pounds working pressure, it is regularly furnished for higher pressures up to 600 pounds. The view at the right shows a test line which maintained 200 pounds pressure for 10 days. The prominent mid-western engineer who made the test said "we found it impossible to make it leak under ordinary hard usage." Doublex Simplex pipe combines the well-known corrosion-resisting qualities of cast iron pipe with a joint that withstands high pressures, at the same time providing for unusual joint deflection and ample allowance for expansion and contraction. A common laborer can lay Doublex Simplex pipe with only one tool—a ratchet wrench. Write nearest Acipco office for descriptive literature.

AMERICAN CAST IRON PIPE CO.

BIRMINGHAM, ALABAMA

Doublex Simplex Pipe bears the "Q-check" mark.

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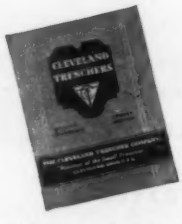

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From all angles,—first cost, operating cost, low upkeep, "Usability" and efficient performance, the Baby Digger has "proved-in."

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"Pioneers of the Small Trencher"

20100 St. Clair Avenue Cleveland, Ohio

The CLEVELAND BABY DIGGER

If a mystic glass could show you how the valve parts will look in ten years

When you are purchasing valves, if you could see what inside workings of the valve will look like after good hard use, it would be no problem at all to pick the right valve. And the Darling Valve is the valve you would pick, even though it does cost more. It has the stamina to continue in giving first class service long after valves that cost a little less have been discarded.

DARLING VALVE & MFG. CO., Williamsport, Pa.

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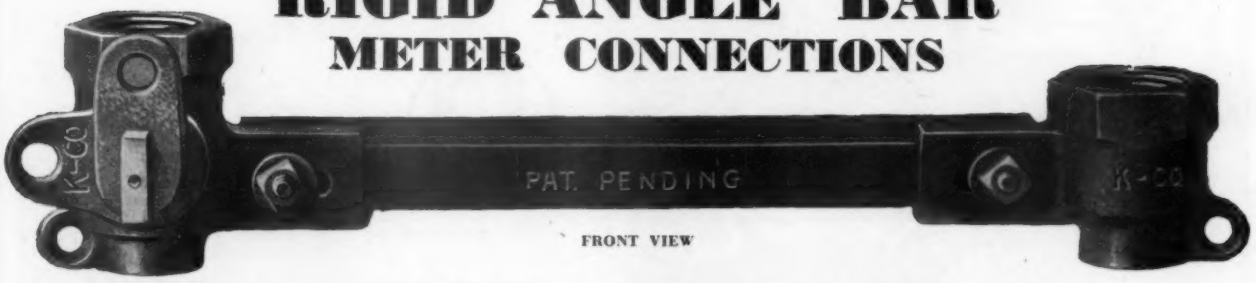
DARLING GATE VALVES

KITSON

RIGID ANGLE BAR METER CONNECTIONS



FRONT VIEW

With Built-In Lock Wing Stop Cock

Use Meter Connections for Meter tie-up. This method eliminates extra fittings, provides support for the meter and makes a first-class installation job.

This adjustable three-piece connection does not require unions, and the stiff angle bar gives rigidity with neat appearance. It has been adopted by some of the largest gas companies and is being used on all sizes of meter installations.

REAR VIEW

The various sizes and styles of Connections and Meters for same are as follows:

K-0— ¾ x ½" with built-in Stop Cock and 9" Bar for 5 A Meter
K-1—1 x ½" with built-in Stop Cock and 9" Bar for 5 A Meter
K-2—1 x ¾" with built-in Stop Cock and 10" Bar for 10 LT Meter
K-3—1¼ x ¾" with built-in Stop Cock and 10" Bar for 10 A Meter
K-4—1¼ x 1 " with built-in Stop Cock and 12" Bar for 20 LT Meter
K-5—2 x 1¼" with built-in Stop Cock and 14" Bar for 30 A Meter

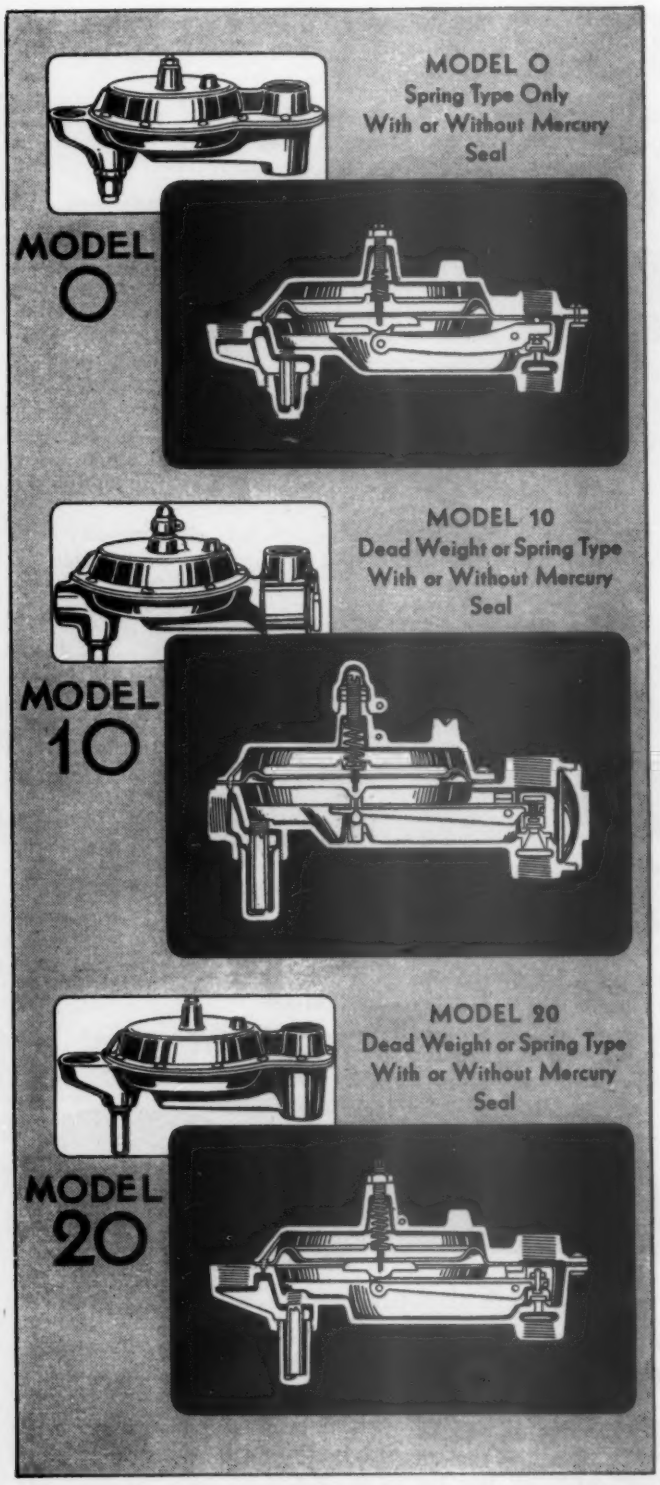
Without Built-In Stop Cock

The various sizes and styles of Connections and Meters for same are as follows:

L-0— ¾ x ½" Meter Connection with 9" Bar for 5 A Meter
L-1—1 x ½" Meter Connection with 9" Bar for 5 A Meter
L-2—1 x ¾" Meter Connection with 10" Bar for 10 LT Meter
L-3—1¼ x ¾" Meter Connection with 10" Bar for 10 A Meter
L-4—1¼ x 1 " Meter Connection with 12" Bar for 20 LT Meter
L-5—2 x 1¼" Meter Connection with 14" Bar for 30 A Meter

KITSON COMPANY

PHILADELPHIA



REYNOLDS Three Service Regulators "Deliver the Goods" 100 percent of the time. Thirty-nine years experience, proved design, and solid construction assure the maximum operating performance and a reasonable maintenance cost. Note below the individual characteristics of Reynolds Models 0, 10 and 20—

Model 0, the old standard, has served successfully for a quarter of a century.

Model 10, all working parts are so accessible as to be interchangeable without removal from pipe line.

Model 20, all working parts are so accurate as to permit complete interchangeability in the shop.

The lever on both Model 10 and Model 20 is of Parkerized steel, which prevents corrosion; also small lever bearing surface, and balanced lever arrangement, increase sensitivity. The dead weight, non-adjustable type is available in Model 10 and Model 20.

GAS CONTROL SINCE 1892

Write for Complete Details!

REYNOLDS GAS REGULATOR COMPANY

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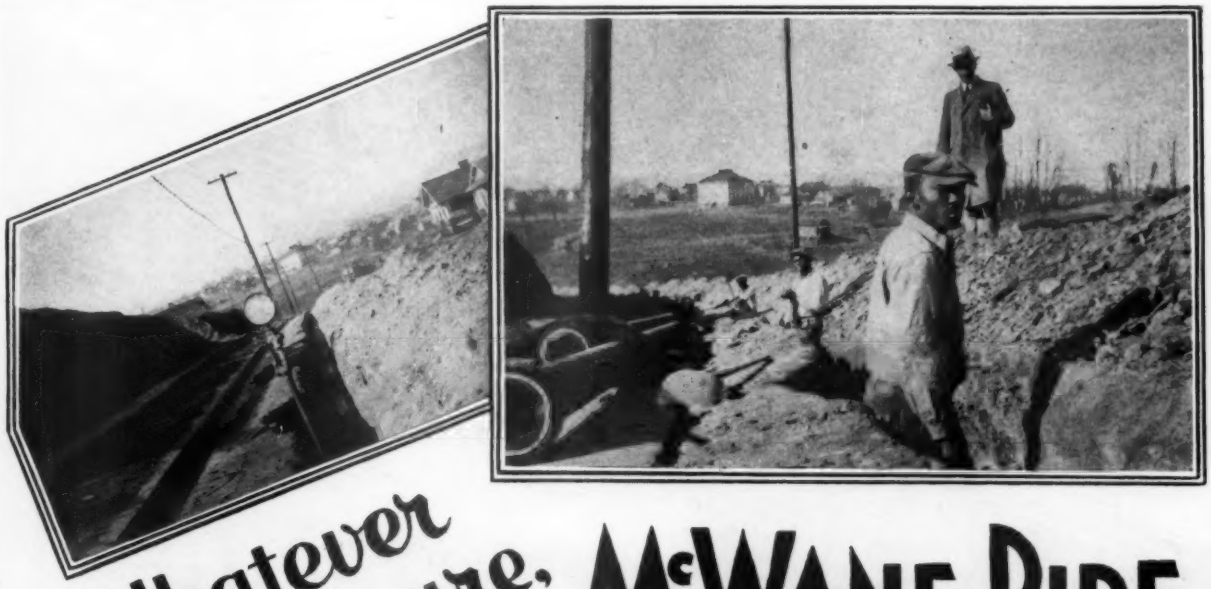


Whatever the pressure— McWANE PIPE

80 pounds, air, was the test pressure requirement met by this 6-inch McWANE cast iron gas main, with Flexpan Joints. And they will hold far higher pressures whenever called upon—now or later. Every possible movement—in and out, or sideways—is provided for by their unique design. Leakproof.

RUSTPROOF PIPE

McWANE cast iron gas pipe needs no coating or coddling. It cannot rust. Smoothness and uniformity, straightness and strength, distinguish it. Mechanically made, modern—yet SAND CAST. Tensile strength averages 30,000 lbs., transverse strength 2,600 lbs. Cuts, taps, ships beautifully. Used by many of the largest gas companies. Investigate it.

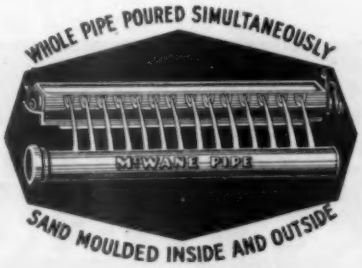
LEAKPROOF JOINTS

A wide range of joints adapts McWANE cast iron gas pipe to all pressures and conditions. Furnished B. & S., plain-ends, or special for various types of trench-made joints. Also with Flexpan factory-made joints, as above; or with McWane recess-threaded joints (no couplings), permitting any pressure, any service, at any time. NO BOLTS.

SMALL SIZES FOR HIGH PRESSURES

1¼, 2, and 3 inch McWane cast iron pipe in long laying-lengths is making tremendous strides in the high-pressure gas field. Get new booklet on it.

McWANE CAST IRON PIPE CO. BIRMINGHAM ALABAMA



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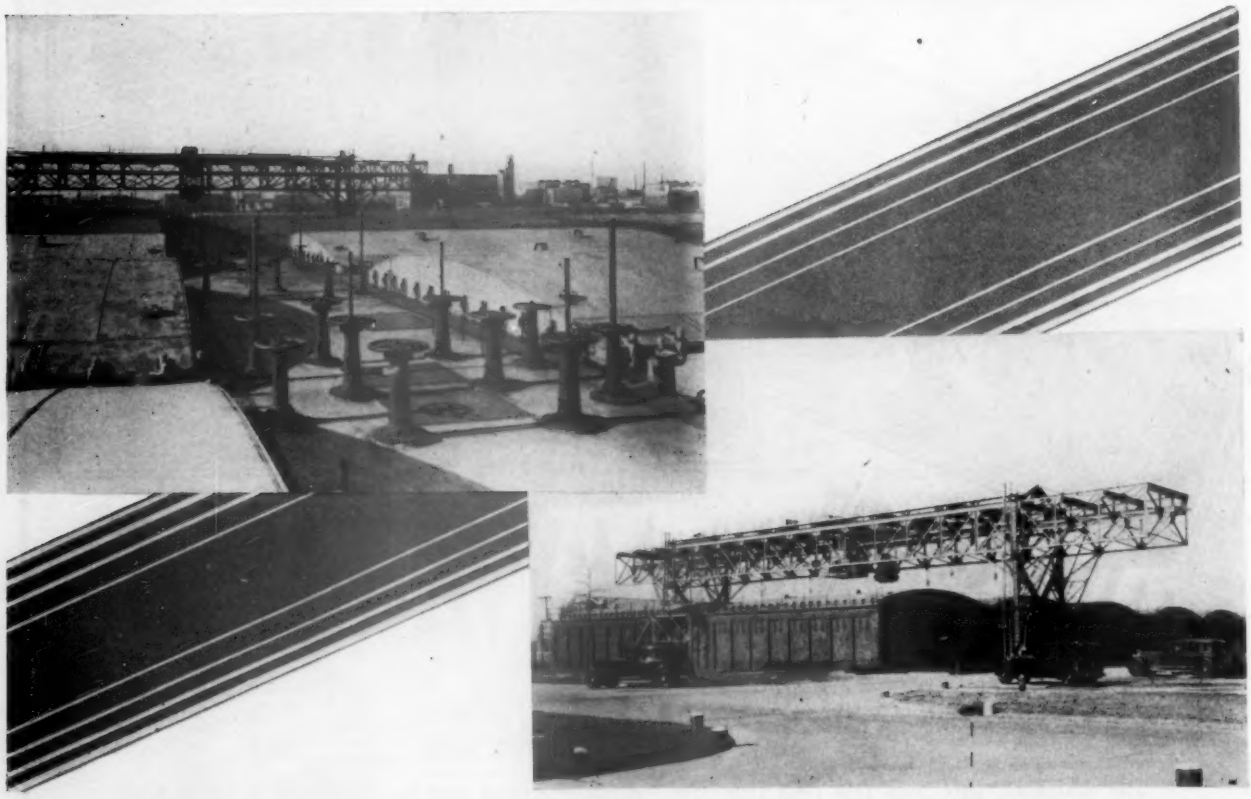

PURIFIERS

of Cast Iron, Steel or Concrete, designed and built for ease in rotating boxes and in handling oxide materials. The Bartlett Hayward Company, with broad engineering experience, has the facilities to design, fabricate and erect purifiers for a wide range of capacities and pressures.

Coal Gas Plants
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Purifiers
B. H. Co. Vertical Centrifugal Scrubbers (Feld Type)
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AMERICAN
GAS JOURNAL
Established 1859 Pioneer of the Gas Industry
Manufactured and Natural Gas

HENRY M. RILEY, *Editor*

A Good Investment

THE COOPERATION which a great number of manufacturers and industries are giving to engineering schools is far from being a matter of mere altruism—it is a good, hardheaded business investment in every sense of the word. Thus, we find many industrial organizations welcoming inspection trips on the part of the students, as well as having some members of their laboratory and engineering staffs act in the capacity of giving lectures before the various classes. Also, in not a few cases, certain companies have either donated outright or sold at a relatively low figure equipment for use in the schools' laboratories and shops. Obviously, it requires no lengthy argument to demonstrate that such practice redounds to the benefit of all concerned; the student, the school and the company.

Our own gas industry, in the past decade, has seen the establishment of gas engineering courses and gas engineering subjects in a goodly number of the best American technical schools. This of itself augurs well for the future handling of the problems that will have to be mastered. But in addition, these institutions of learning, in order to turn out an efficient product, must depend on cooperation from two sources; the various gas companies and the organizations manufacturing equipment and supplies used in the gas industry.

This cooperation, as indicated, includes the offering of authoritative lecturers, granting the privilege of student inspection in plant and factory, and, within reason, seeing to it that the schools are not operating their shops and laboratories with lack of equipment or equipment that is woefully out of date.

It is a well known fact that it costs the school considerably more than the money represented in tuition and laboratory fees to turn out its graduates. Further, it should also be well recognized that these graduates will for the most part eventually gravitate into positions in industry where they will help lead the way to more economical operation. With these two ideas in mind, equipment manufacturers should deem it worth while to go out of their way to the end that the various schools needing modern gas equipment will be able to procure the same on terms that are not a financial strain on their pocketbooks.

It is not wholly far-fetched to believe that some manufacturers might be in a position to include in their yearly budget an amount to be charged off against "progress," which would be represented by the regular selling price of a certain quantity of equipment less the terms that would be quoted the school. In the not distant future such a debit would turn out to be a rather handsome credit.

Have You Made Your Winter Pressure Survey?

PRESSURE SURVEYS at peak-load periods are vital in planning for future development. Any company that has not completed its survey for the present winter season should make haste to do so before the close of the present month. Surveys made after the worst of the heating loads have disappeared are often very comforting, but may be grossly misleading.

And it is not amiss to emphasize that such pressure surveys should be a continuing affair. Especially in communities where there is a growth in house heating, and this is almost universally the case, most unexpected "lows" of pressure develop. These lows result first in mere inconvenience to the customer. But they shortly develop into a serious interference with good service and may finally become an actual menace through the danger of extinguished pilot lights.

The investment in a goodly number of eight-day recording pressure gages is well justified to prevent even the early stages of such difficulty. By judicious scheduling of trips for attention to the gages a permanent and complete pressure record can be built up at nominal cost. Distribution foremen, meter readers, collectors, and even representatives of the sales department are all available as attendants for such gage stations. In fact, it may not be amiss to place the gages permanently in the home of some of the company staff where practically free attendance can be assured with no real burden on the employee. Certainly staff men who have the company interest at heart will not mind spending a few minutes of their own time once a week in winding the clock, inking the pen, and changing the chart on a pressure gage. If there is any evidence that they do resent this extra service it is a very good indication that they should be placed in the A-1 priority class for early discharge.

Safety Instruction Never Goes too Far

RECENTLY there have been many examples which demonstrate the wisdom of first-aid training for entire company staffs. There were many favorable comments on the award at the last A. G. A. convention of the Addicks medal to J. A. Harvey, of Auburn, New York. In that case a tinsmith, through unusual meritorious service, was able to save the lives of six of his company associates in an entirely different department of the company's organization.

Recently The Peoples Gas Light and Coke Company has recorded a case where one of its bookkeepers in the customers' accounts department was able to save the life of a young woman overcome by gas in a neighborhood cigar store, because he had been taught the Schafer prone-pressure method in the safety-first classes of his company. Doubtless there are scores of other instances of like significance. They have demonstrated clearly that not only works and distribution foremen may have an opportunity to apply in their immediate staffs the methods of first aid.

The need for training extends far beyond the daily routine of company business, and the opportunity for service given to company men because of knowledge of first-aid methods is of incalculable value. Such training establishes a new basis for esprit de corps within the company and creates a spirit of self-confidence and personal helpfulness that makes for increased usefulness in every station of life.

Executive budgets that have not provided for adequate first-aid training of many company employees during the present year should be scrutinized again with a view to possible revision in order that the small funds needed will surely be available. Such expenditure is not a cost. It is really an investment in future opportunity.

Availability of Information

IT HAS often been said that a good engineer is one who, in addition to having other desirable qualities, possesses the happy faculty of knowing where to put his finger on wanted data and information; this as against attempting to carry such things in his head. One might go a step further and aver that the *best* engineer is he who knows where to put his finger on the data with a minimum expenditure of time.

With the rapid expansion of industrial gas utilization, the industrial gas manager and salesman must have recourse to a great mass of information. Primarily, of course, they must be *salesmen*, but almost as important, they must be conversant with furnaces and utilization equipment to the last degree. With the keen competition offered by electricity and oil, to mention nothing of the older, solid fuels, there is no place for guessing at the efficiency or productive capacity of a furnace. Further, there is scant time for looking up these and other related data.

With this idea in mind *American Gas Journal* has arranged for the publication of a series of articles which will record in succinct and easily available manner the various characteristics of gas fired furnaces and similar utilization apparatus. The current issue carries the first of the series and it is hoped that it and the succeeding installments will facilitate industrial gas selling.

**Service,
As Usual**

WE ARE reproducing an editorial from the current issue of Nation's Business and its perusal is earnestly recommended to all and sundry. As we see it, it is refreshingly apparent that the customer can still open the appliance cock, ignite the burner and proceed with the thermal task—gas is still in the mains and is being used. Just how much will have been used by the time December 31st. rolls around depends largely on our willingness to dig in and sell both the idea of greater gas usage and faith in American business as a whole.

Our employee rosters must be kept up to the mark and all must buckle to the task of assisting in leading to better times.

Danger! Men at Work

WE ARE entering, let us hope, the final stage of our folly. The air is charged with rumors. The whispering campaign is on. No business is immune.

Have you heard about such and such a bank? Do you know old So-and-So is going to the wall? I hear the Doe Company is headed for receivership. The Roe Company has passed its dividend.

Only by wearing ear muffs can one walk a block without having his confidence shaken.

> Of comfort let no man speak;
> Let's talk of graves, of worms, and epitaphs.

Depression is on every tongue. It is the most widely advertised product of our times. Headlines, headlines everywhere, and no one stops to think.

And our vaunted salesmanship! Give a salesman time enough and he'll paint so drab a picture of the future that a likely prospect will replace his fountain pen—and lock the safe.

Of unemployment, I suspect there are more idle tongues than idle hands.

The folly of too many of us is to accept the echo of the locker room and club car as the Voice of America.

For example, consider 1930, lately interred. Now lies he there and none so poor to do him reverence. Yet that much-maligned year loaded and unloaded 45,800,000 freight cars, and with three million trucks on the job, too. It made and sold a new automobile for each ten families at a cost of $2,159,600,000, and saw registrations highest of any year, with a gasoline consumption of 399 million barrels, an all-time record. It saw electrical production hit its highest mark.

Nineteen hundred and thirty manufactured four and a half billion yards of textiles, and 315 million pairs of shoes, *the usual two and a half pairs to the person.*

It provided work for forty-odd million men and women, and earnings through dividends to the amount of $4,500,000,000.

Nineteen hundred and thirty saw to it that expenses of living did not exceed income, as evidenced by hundreds of millions of dollars increase in savings banks and eighteen and a half billions of new life insurance.

Nineteen hundred and thirty added one million in population to our consuming public—a city the size of Cleveland.

With all its faults, 1930 furnished a national market-place where goods, services and labor were exchanged to the extent of 100 billion dollars, and the returns are not all in yet.

One would think, from the wailing, that we had all been wiped out by a terrible catastrophe of Nature—a Noah's flood, a shifting of the Gulf Stream, or by dreadful holocaust.

Yet we are all here. The stores are still open. The trains are running. You can get that number on the telephone. The traffic problem is still lively. Movie houses are no nearer seating all their customers. Children are what they always were. Young folks are getting married. Preachers thunder against the laxity of the age. Amos 'n' Andy are still in the taxicab business. Doctors and dentists make appointments weeks ahead. Lawyers' briefs are just as long. Hardy commuters make the 8:15 in less than nothing flat. And under Nature's white coverlet, bud and blossom await the sure coming of spring.

If these commonplace signs of "life as usual" betoken national instability, then there is a public menace in the familiar warning:

Danger! Men at Work

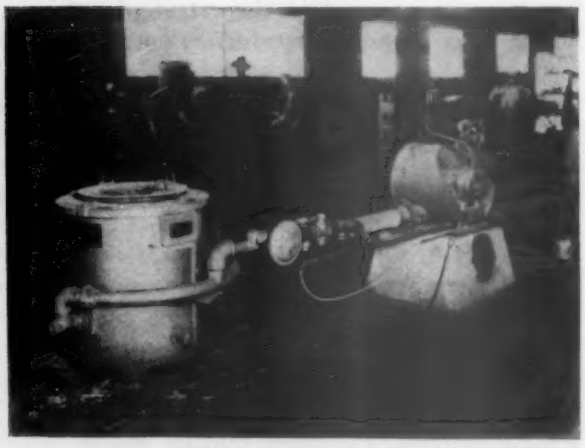
Merle Thorpe

Industrial Furnaces For Gas

I--Metal Pot Furnaces For Soft Metal Melting

LAWRENCE E. BIEMILLER

Supervisor Fuel Sales, Consolidated Gas Electric Light and Power Company.

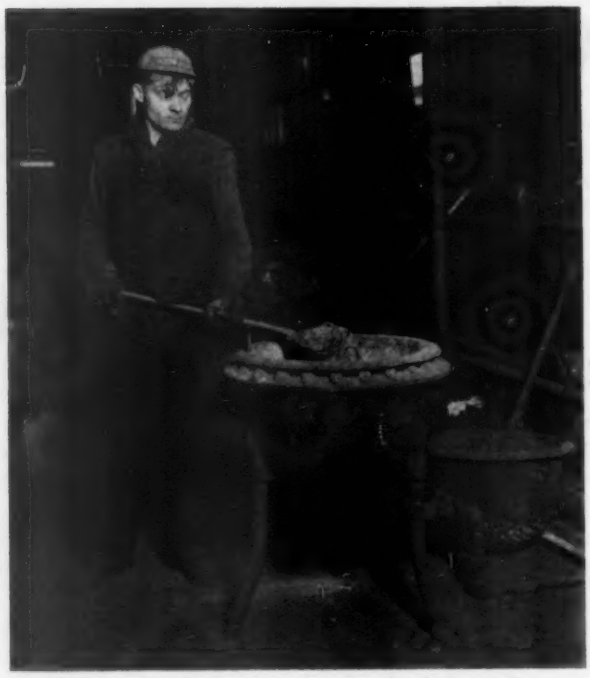


Aluminum Melting Furnace

THIS, the first of a series of articles devoted to Industrial Furnaces for Gas, treats of furnaces with metal pots, which are used in the melting of soft metals. Soft metals are taken to include lead, tin, babbit, zinc, solder, type metal, white metal alloys, and aluminum. With the exception of the latter most all of these melt at temperatures well under 1000° F.

The following tabulation gives data on important metals:

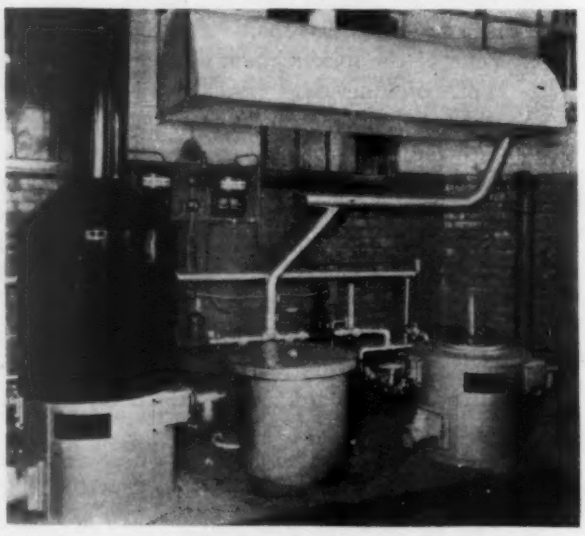
Metal	Symbol	Lbs. Per Cu. Ft.	Specific Gravity	Melting Point °F.	Specific Heat	Latent Heat of Fusion
Tin	Sn	458	7.35	450	.0562	25.6 B.T.U. per lb.
Lead	Pb	710	11.38	620	.0314	9.66 " "
Zinc	Zn	437	7.00	786	.0956	50.5 " "
Aluminum	Al	167	2.67	1214	.197	174.0 " "
Copper ..	Cu	530	8.50	1981	.0951	77.4 " "



Typical Atmospheric Soft Metal Furnace

Data such as this has different uses. For instance, the weight per cubic foot or specific gravity is required to calculate the proper size of pot to melt a given amount of any metal. The melting point, specific heat and heat of fusion are necessary to calculate the fuel capacity required for a given operation, and the type of furnace which should be used. The following are calculations of the theoretical amount of heat required to melt one pound of each of several metals, beginning at room temperature, and not heating the molten metal beyond the actual melting point.

Lead	.0314	(620-60) + 9.66 =	27	B.T.U.
Aluminum	.197	(1214-60) + 174 =	401	B.T.U.
Copper	.0951	(1981-60) + 77 =	260	B.T.U.



Soft Metal Melting Furnaces

Converted Solder Pot

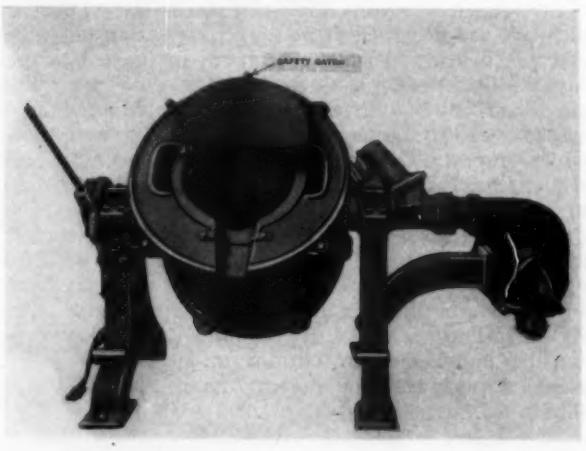
The actual heat required is much greater due to losses in flue products, by conduction and radiation, as well as the heat required to bring melt to desired pouring temperature, and heat put into furnace on initial heating up. Examples of actual heat requirements for well built furnaces, are given in the cases of the several furnaces described in detail in this article. If these are compared with the theoretical, the effect of thermal efficiency, and load factor under which used, can be readily appreciated.

In addition to pure metals the industrial gas engineer is greatly interested in alloys. One much used alloy is a mixture of tin and lead called solder, which depending upon the proportions in which mixed, melts anywhere from 340° to 440°. White metal alloys are often made of tin, antimony, lead, copper, and zinc, or 3 or 4 of these metals in widely different proportions, depending upon the use to which the alloy is to be put. For instance, engine bearings of one large railroad company are composed of 89% tin, 9% antimony, and 2% copper, while their car journals are composed of 62% lead, 25% tin and 13% antimony.

Small Tin Pot

It is very important that the correct furnace be specified to melt such metals and alloys. The furnace must be of the correct size, for one which is too large will require too much time for heating up, as well as consume too much fuel while operating. It must be of the proper shape to accommodate any object receiving a metal coating in it. It must have burner equipment large enough to melt the desired quantity of metal in the desired time, and small enough to permit holding a desired temperature without backfiring. It should be designed and constructed of materials which will give high thermal efficiencies, and low repair costs.

A usual type of furnace for melting metals of low melting point such as lead, zinc, tin and babbitt is the Soft Metal Melting Furnace of which two are shown in the accompanying picture. These furnaces are made in sizes with a pot from 12 inches in diameter and 12 inches deep to one 26 inches in diameter and 20 inches deep, with lead capacities from 470 to 3,200 pounds. The capacity of the pot can be melted down from a cold start in from 1¼ to 2 hours using about 185 B. t. u. of gas per pound of lead, under such conditions. The gas used on subsequent melts is dependent upon the rate at which the melted metal is used. The gas to hold these pots at 700° F. varies from 9300 to 54,000 B. t. u. per hour for the different sizes.



Tilting Metal Pot Aluminum Melting Furnace

The heat balance of a typical 2,000 pound lead pot when melting lead to 700° F. at varying rates, in a furnace already hot, is as follows:

	Pounds of Lead Melted Per Hour			
	500	1000	2000	3000
	B.T.U.of Gas per Hour			
Burner Capacity	187000	187000	187000	187000
Conduction and radiation loss	23000	23000	23000	23000
To melt metal	15000	30000	60000	90000
Loss up flue	10000	13000	21000	28000
Thermal efficiency of furnace in per cent	31	46	58	64

Since soft metals with the exception of zinc do not attack the pot, it is usually allowed to remain partially full of metal. As a result burners are applied tangentially near the top of the pot, as they prevent cracking of the pot on initial heating. The burners use either high pressure gas or low pressure gas and air at one pound, supplied through a proportional mixer. The pots are pressed steel in the smaller sizes and cast iron in the larger sizes. It is desirable but not essential that

the furnaces be connected to a flue. In the same way it is desirable for best shop conditions that these furnaces have a hood if it does not interfere with working them. These furnaces have an outer shell of heavy steel, 1½ inches of insulation and 3 inches of firebrick.

Such Soft Metal Melting Furnaces can be used for occasional melting of aluminum but aluminum should be melted in a more heavily insulated furnace with greater burner capacity. The following is a comparison of the same size soft metal and aluminum furnace.

	Soft Metal	Aluminum
Diameter—In.	20	20
Depth—In.	20	20
Capacity—Pounds	2,000 lead	450 aluminum
Burner Capacity—B.T.U. per hour	187,000	1,150,000
Insulation	1½ In.	5 In.
Pot Material	Grey Cast Iron	Car Wheel Iron
Maximum Pot Temperature	1,000	1,500
Combustion Chamber Temp.	1,200	16-1800

Stationary Aluminum Melting Furnaces of the type pictured are designed for complete draining of the pot after each heat, so rings are placed in the pot to make easy its removal by a block and tackle. When operating this furnace with a pot 20 inches diameter and 20 inches deep, and running five heats a day the gas used will average 1,855 B. t. u. per pound of aluminum. Subsequent heats after the first can be melted in from 45 to 50 minutes. Average pot life is about 50 heats.

Standard furnaces with atmospheric burners can be secured from many different manufacturers, which are suitable for soft metal melting when the production is not great and the temperature range does not exceed 600 to 700° F. These furnaces have cast iron pots, and can be supplied with bottom outlet. They have a rammed plastic lining varying from 1 to 1¾ inches thick.

Advantages of Tilting Type Furnace

Pots of the several types previously described usually have their metal dipped from them, though they can be secured with special bottom outlets for pouring. Another type of furnace used particularly for aluminum melting, is the Tilting Type Aluminum Melting Furnace with Cast Iron Pot which is pictured. Some foundrymen like the tilting type furnace for melting aluminum for the following reasons:

1—No foreign matter can be introduced into the molten metal by a dipping ladle.

2—The furnace can be completely emptied at night.

When a close grain hard iron is used the average life of a cast iron pot is about 55 heats, though it may be as much as 80 to 100 heats. This furnace is equipped with a premix burner system of about 500,000 B. t. u. per hour capacity and has a pot 19 inches diameter by 14 inches deep. The first melt will be made in about two hours, while subsequent melts will take little over one hour. This furnace is lined with specially shaped firebrick refractory varying from 3 to 4½ inches in thickness, and no insulation is used.

So far this article has described gas designed furnaces such as the Industrial Gas Engineer should recommend where new equipment is to be purchased Sometimes gas burners are to be specified for existing pots. If so the first thing to be decided upon is whether to use atmospheric burners, or blast type. Unless the furnace is very small the latter type should be used.

The Converted Solder Pot pictured has a capacity of six tons and is equipped with three Nozzle Mixing Burners, each having a capacity of 300,000 B. t. u. per hour. They use gas at three inches and air at six ounce pressure, supplied through a proportional mixer. The furnace is covered with two inch block magnesia, and is equipped with a hood and flue which prevent escape of fumes or products of combustion into the shop. The flue contains a damper which is set to give desired furnace conditions.

The Tin Pot pictured is 4 feet long, 2 feet wide, and 10 inches deep at the deepest part and has a capacity of about 1500 pounds. It is used for the tinning of dairy products. Since the weight of material put in to be tinned, and the quantity of tin removed is very limited, it is satisfactorily heated with atmospheric pipe burners. There are two burners extending longitudinally of the pot, each with two rows of 3/32 inch ports, three to the inch. They are of 1½ inch pipe and are supplied through 1½ inch atmospheric injectors. Each burner burns 80,000 B. t. u. per hour, with gas at 3 inch pressure. The temperature of this pot is maintained at 525° F. by means of an automatic temperature control. It can be brought up to operating temperature from cold in one hour.

This article considered only a limited field of metal melting and will be followed by articles describing crucible furnaces; pot furnaces for hardening and tempering; as well as special furnaces for galvanizing, tinning, stereotype melting, etc. The above applies in the use of natural gas as well as manufactured gas.

(*Series Continued in March Issue*)

Use of Natural Gas at Refineries

GAS is an important refinery fuel, as is shown by the fact that it supplies nearly 40 per cent of the total heat units derived at refineries. Although one refinery reported burning manufactured gas in 1929, it can be considered that there are but two kinds of gas utilized at refineries—natural gas and refinery or still gas. Up to and including 1928 natural gas exceeded refinery gas as a source of heat at refineries, but in 1929 the total quantity of B. t. u. obtained from the latter was considerably in excess of the B. t. u. obtained from natural gas. However, from the standpoint of quantity, natural gas slightly exceeded refinery gas in 1929—103,729,000,000 cubic feet of natural gas was burned compared with 98,727,000,000 cubic feet of refinery gas. The greater number of B. t. u. obtained from a smaller quantity of refinery gas is due to the fact that its heat content is higher. This will be discussed at greater length on a subsequent page.

Prior to 1927 the use of natural gas as refinery fuel showed a steady increase, but in 1927 the pendulum swung toward the use of other fuels, particularly oil. This was due primarily to prices; the price trend for natural gas was upward, for oil downward. In addition, natural gas faced more and more competition from refinery gas. Every district except the East Coast and Indiana-Illinois uses some natural gas as refinery fuel, and all of them reported a decrease in consumption in 1929.

"The vast array of experience points to the fact that in reality automatic control pays not only its entire first cost quickly, but returns large dividends as well"

Why Manual Control?

Automatic control on natural gas industrial installations effects substantial savings

J. LYLE VANCE

Exhibit Manager, Natural Gas Bureau, Los Angeles

A NEW COMPANY starting into the manufacturing business is often faced with the necessity of omitting some of the much desired equipment with which others in the same line have equipped themselves. When their process includes one or more heating operations they are prone to omit at the start the automatic heat controls. This is sometimes done by reason of the unusual mechanical skill of some of the organizers or the operators they are securing.

A young company has everything at stake at the time of launching their new product. If they choose to make a standard grade article they must offer some inducement, usually price, if they are to wean away the buyer from his established source of supply. If they choose to make a superior article its outstanding quality must be evident or demonstrable. In either case the new article will be subjected to closer scrutiny and more rigid tests than will the product of an established manufacturer and deliveries will be closely watched to see that each article is uniformly equal or superior to submitted samples.

With these ideas in mind, coupled with the knowledge that automatic temperature controls for heating equipment are consistently purchased and used by the most conservative and thorough going factory executives, the writer set out to get some first-hand expressions on manual vs. automatic control from veteran users who had had experience with both types. All those interviewed were at the helm of industries using natural gas exclusively in as many applications as the nature of their business required.

The automatic storage water heater manufacturing business is admittedly a highly competitive line where cents and fractions thereof are closely watched. Here the temperature of the galvanizing tank up to two years ago had been manually controlled, but the assistant manager quickened to the opportunity of pointing out the many savings he had made as a result of applying automatic control.

The most outstanding point in his estimation was the fact that the amount of dross from the galvanizing bath had been reduced by 27%. Of almost equal importance was the increase in pot life. As the temperature increases the chemical reaction of the galvanizing bath on the pot is increased and since with manual control it was impossible to keep the temperature down at all times, a year was the extreme life of the pots.

At the time they installed the Brown Instrument Company's automatic controller recorder they also installed a new pot and as yet it shows no signs of the need of replacement. In fact they are beginning to speculate upon the probable service they are going to get from it.

There have been savings of labor and increases in production although no accurate records have been kept on this item. With manual control the night watchman operated the holding fire and was supposed to have the pot at proper temperature for the working crew when they arrived. Some nights being cooler or warmer than usual meant that many times the galvanizing bath was too cool or too hot and the men had to be put to other tasks until work could be run through. At other times during the day the temperature often got away from the men and they had to be put to other tasks until the temperature became right for dipping. The automatic control has overcome this for at a certain hour the night watchman sets the controller and the men go to work and continue steadily throughout the day. The labor is thus conserved and more material run through due to the fact that the bath is at proper temperature during the entire shift.

Proper temperatures have made savings in material and a more uniform product, although old records now stored away could not readily be consulted to give accurate comparisons. Too low temperatures caused the galvanized coating to be too heavy and temperatures too high caused the coating to be too thin. Uniformity has

done much to improve the quality of the work and direct benefits have resulted which have been very gratifying.

The saving of gas could not be readily traced owing to the fact that there were no sub-meters on the various pieces of equipment used throughout the plant.

As a result of the satisfaction given by automatic control they have recently added an entirely new use for gas by installing a 15 H. P. Lattner Automatic Steam Boiler to heat their pickling tank through which the water heater tanks are passed just prior to dipping in the galvanizing bath. This boiler is absolutely automatic in every respect, keeping a uniform steam pressure and water level without requiring an attendant. Before this boiler was installed they used a cold pickling tank which required several hours, while now the pickling process is completed in from thirty-five to forty minutes and the solution is of but 2% acid strength instead of 10%.

This latter use for gas came as a direct result of savings effected by their first automatic control application and represents a clear gain in load to the gas company serving them.

How a Tile Manufacturer Profited

Order out of chaos was brought to a large manufacturer of bathroom and other high grade tiles with savings of such amounts that they were reticent about quoting them.

The process of tile manufacture is probably one of the most touchy ones that is to be found anywhere. The baking of the colors and glazes is particularly a critical operation. Every color has to have its own particular heat held within very close limits to bring it out in exactly the shade or tint desired.

When heats fluctuate beyond and below the correct point the colors of the tiles vary through quite a range and this means a very large increase in the labor of sorting and the loss of many tiles owing to the fact that they are entirely beyond the usable color range. Loss of production is sometimes quite critical because if the plant is running through a large order of a definite color, a very considerable excess number of tiles must be run through to assure a sufficient quantity of the desired color after the off color tiles are sorted out.

The application of Wilson-Maeulin Pyrometer Controllers in this plant has been particularly helpful. Temperatures are held to within 5°F plus or minus of the desired point. The application to the type of kiln used was not so simple as in many other industrial processes and before the present results were obtained success was several times despaired of.

The glaze kiln is this company's own patented design, a continuous conveyor full-muffle type with thermocouples in both fire chamber and muffle working on the same controller. The company operates six of these tunnels and in addition to the saving of sorting labor and material they have effected a saving of four operators since applying the automatic controls.

This company used natural gas before, as well as since applying the controls, and even with fuel oil available at 40c per barrel feel that natural gas with its controlability, its freedom from sulphur, cleanliness and constant availability would not justify a change. No cost records on savings of gas since applying the controls have been kept.

The same type of controls have since been applied to the biscuit kilns of this tile company with the result that better biscuits have been produced in greater quantity with a saving of one operator's time. These kilns are direct fired and the absence of a muffle made the application more simple. The same closeness of temperature control has been accomplished.

Control on Drying Oven

In the plant of a large manufacturer of plaster board, used as a lath and plaster base, their drying oven was originally equipped with automatic control, but owing to the fact that the gas burners would not accommodate themselves to the control, an entirely new burner and control installation was necessary, going to prove that automatic controls alone cannot solve all of the problems. In fact before making the present installation, equally as good results were obtained with manual control as with the control equipment.

In the original installation and with manual operation the best results that could be had were 85% first quality boards, 10% second quality, and 5% culls or rejects. The installation of a Foxboro Controller and Leahy Multi-Jet gas burners has caused the output to run to a full 99% first quality sheets and has relieved the operating foreman of all care and attention. In addition there has been a gas saving of approximately 5%. This latter represents an average of 12,000 cubic feet per day. In this installation the quantity of material run through was not increased yet the salable product was increased by the 5% represented by the rejects produced under the former operating conditions.

A large electric motor manufacturer uses an oven for curing motor stators after the application of their impregnating compound. This compound insulates the windings of the stator and is resistant to very high temperatures. The compound is their own formula and the curing removes from it the carrying medium. Very close temperature control is imperative, temperatures too high would cause brittleness in the insulation and temperatures too low slow down productions.

The complete control set-up includes Robertshaw control, Surface Combustion Proportional Mixer, Minneapolis Honeywell motorized gas valve for automatic gas shut off due to electrical current failure.

Control Builds Bakery Business

A cookie bakery increased the demand for their product until they grew from a small business to one operating on a real production basis. They started without automatic control, but the time came when they awoke to the realization that manual control of their oven was causing them tremendous losses through spoilage from improper oven heats due to necessary forcing of the production. Automatic control saved the day for them and put them back on a profit earning basis such as they had never enjoyed before.

The very few cases cited here do not include any of the steel treating processes where lack of automatic control is practically unknown. Innumerable other actual cases, however, could be recounted where automatically controlled natural gas fired industrial processes are satisfactorily profitable only by reason of this type of control. It therefore behooves the industrial gas engineer to bend every effort to induce the prospective consumer to equip his installation at the start with full automatic control so as to obviate any possibility of the endless chain of setbacks which follow in the train of attempts to put dependance upon human skill or watchfulness. The vast array of experience points to the fact that in reality automatic control pays not only its entire first cost quickly, but returns large dividends as well.

The Complete Gasification of Coal

Dr. R. MEZGER and Dr. T. PAYER

Das Gas and Wasserfach, 1930, pages 1-8

THE development of plants for the complete gasification of coal from the structural standpoint during the past few years has brought about quite some progress in the design and construction of gas making apparatus. The early troubles had to be overcome as in all like cases. The first expectations of the process were far in excess of what could really be accomplished with it, which is characteristic of most technical innovations. A complete revolution of the art of gas making was prophesied. The manufacture of gas was to be taken out of the oven and transferred to the producer or generator. After a while the actual limitations of the process became more clearly defined.

The mixed gas process has become a valuable addition to the art of gas making. Complete gasification affords a means of meeting peak demands. No other method of making gas is so adaptable as this process. The installation can be made ready within a few hours and full production can be obtained within a short time after starting. The installation can be stopped operating just as quickly and the production of the installation can be easily adjusted to meet the requirements at any moment in the operation. It is also a definite advantage of the process that the apparatus can be used at any time for the production of water gas from coke when the necessary carburetting equipment is provided. It is accordingly possible to make gas in this apparatus with a thermal value of from 300 to 475 B.T.U. This is a very important advantage of complete gasification.

Valuable Data

Tabulation Number 1 gives some highly interesting and valuable data on the amount of gas which is necessary to give a mixed gas of 475 B.T.U. per cubic foot from coal gas. Producer gas is also shown in the tabulation for comparative purposes as a gas which can also be added to the coal gas. The use of producer gas is, however, risky for the reason that this practice results in a marked increase of the specific gravity of the mixed gas, which can give rise to difficulties and troubles in the utilization of the gas, as for example flare-back of the flame in the burners. The only reason for including producer gas in this discussion is, therefore, to afford a means of comparison. The following heating values are taken as standard for the different gases: coal gas, 585 B.T.U. per cubic foot, mixed gas (that is, blue gas and coal gas made together in complete gasification) 400 B.T.U. per cubic foot blue gas 300 B.T.U. per cubic foot, producer gas 140 B.T.U. per cubic foot and mixed

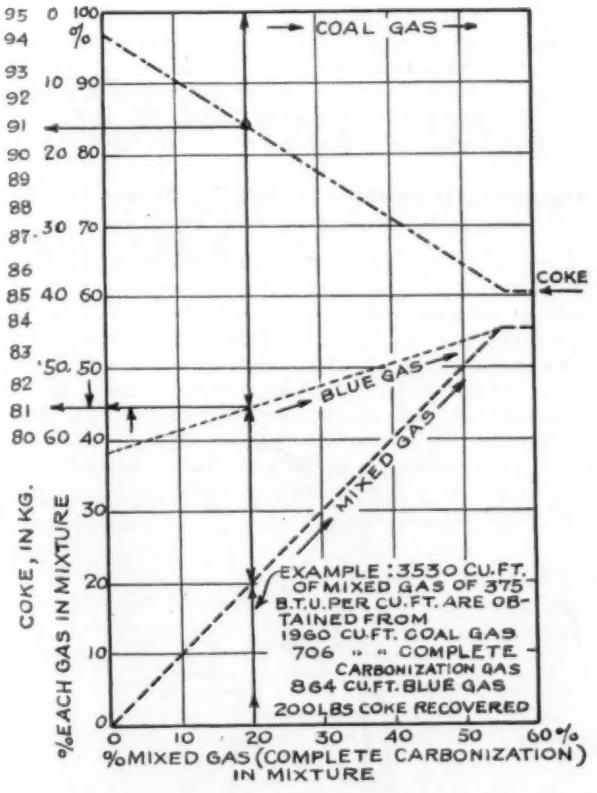

COAL GAS
COKE
BLUE GAS
MIXED GAS
EXAMPLE: 3530 CU.FT. OF MIXED GAS OF 375 B.T.U. PER CU.FT. ARE OBTAINED FROM
1960 CU.FT. COAL GAS
706 " " COMPLETE CARBONIZATION GAS
864 CU.FT. BLUE GAS
200 LBS COKE RECOVERED
COKE, IN KG. %EACH GAS IN MIXTURE
%MIXED GAS (COMPLETE CARBONIZATION) IN MIXTURE

Figure 1.—Preparation of a Mixed Gas of 375 B.T.U. per cubic foot from Coal Gas, Blue Gas and Complete Carbonization Gas as well as Coke Yield in Production of 100 Cubic Meters (3530 Cubic Feet) of Mixed Gas

gas (the water gas and coal gas being made separately and mixed after manufacture) 475 B.T.U. per cubic foot.

TABULATION NO. 1

Kind of gas	In the average production of 11,300 cubic feet from 2204 pounds of coal, the following quantities of gas can be added. (cubic feet) Required quantity of gas to make 3530 cubic feet of gas (mixed)			
Mixed gas (from complete gasification)	14000	1960	——	——
Water gas (blue gas)	7000	——	1360	——
Producer gas	3430	——	——	872
Coal gas	——	1570	2170	2658

It is evident from this tabulation that when mixed gas (from complete gasification) is added to coal gas, much less of the latter has to be manufactured in order to obtain a definite quantity of mixed gas with the heating value of 475 B.T.U. per cubic foot (maximum) than of the other gases used for mixing purposes.

Figure 1 affords an easy way of determining the mixing ratios of various makes of gases,—coal gas, blue gas and mixed gas (from complete gasification)—to obtain a mixed gas of 475 B.T.U. per cubic foot. The use of the graph and of the aforegiven tabulation may be explained by means of a numerical example.

The mixed gas (from complete gasification) is to be, for example, twenty per cent of the final mixture. A line, parallel to the ordinate axis, is drawn through this point and extended through the dotted curve (blue gas curve) and continued to the top of the figure. As may

be seen from Figure I, the percentage of water gas in this case is 44.5-20 or 24.5 per cent and of coal gas 100-44.5 or 55.5 per cent. The curve diagram also contains a line which shows the accumulation of coke that is available for gas making purposes.

Operating Difficulties In Making Mixed Gas By Complete Gasification and Their Causes

Experience has shown that not every coal is satisfactory for complete gasification; in fact, unfortunately few coals are suitable. Most of the operating difficulties that have been encountered in the complete gasification process are due to the use of an unsuitable coal. The question is, what are the difficulties that arise due to the use of unsuitable coal in the complete gasification plant? An attempt will be made to explain these by following through the operations in the generator or producer portion, as well as in the carbonizing portion of a complete gasification installation.

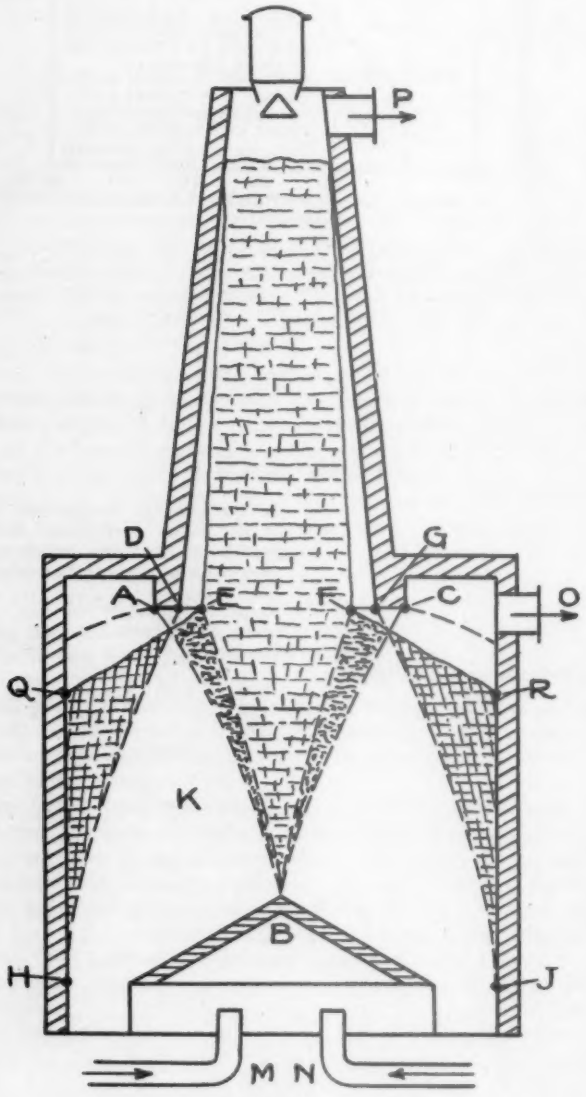


Figure 2

Figure 2 is a generalized representation of apparatus which are used for carrying out the complete gasification process in the production of coal gas and blue gas. The air, which enters at (N) during the blow passes, through the generator with the production of blue gas through a section, which is shown as ABHQ and CBJR in vertical plane through a conical volume generated by the rotation of this plane. The coal, which is in the column of fuel in the retort (L), makes impossible the passage of the gas through the section line AC. This means in other words that a volume, which is generated by the rotation of the vertical section through ABC, is not hot-blasted. The blow gas is removed through the outlet (O).

In the "make" run part of the process the steam, which enters at (M) or the flow of blue gas made with it, takes the path of the sections DEBH and GFBJ. The reason for this is that the cake of coke is pushed back by the walls of the retort due to the usual conical shape of the latter with the result that an annular open passage or channel is formed, which is shown in the cross-section by DE and FG. Only a very small amount of the gas passes through the section EBF, for the reason that the body of fuel is very dense at this point and offers a high resistance to the passage of the gas. The sections DQH and GJR are scarcely touched in all cases during the "make" run and hence not cooled down.

The result is a series of inconvenient phenomena, which have a marked effect on the smooth course of the process, if they do not make it entirely impossible. The zones at the walls of the apparatus, namely DHQ and GJR, are strongly overheated, for the reason that only slight cooling takes place there during the make run. This causes the coal to burn alongside the walls and clinker to become fastened to the walls, resulting in the formation of bridges. The core of the fuel in the generator, shown as EFB, remains black. Uncarbonized material slides down into this space from the retort. Instead of carbonization finally ceasing at the dividing line DG, this actually proceeds almost to the grate within the limiting section EBF. Valuable hydrocarbons are, accordingly, lost in the blow gas during the blow, which represents in a certain sense external heating of the material within the section EBF. These hydrocarbons are decomposed into gases of lower heat concentration, and this means that, as far as the actual gas making process is concerned, they are lost. Furthermore, the decomposition of the steam during the make run is bad and hence the quality of the blue gas is also bad. However, a very special and important disadvantage is that the cross-sectional area of the generator is only partially used for the production of gas, and the production of gas and the throughput of fuel per square foot of cross-section area are accordingly less than usual.

Application Limited

The troubles that have been encountered up to the present time in operating the complete gasification process are all clearly explained according to the above exposition. The constantly proposed carbonization of coal with the aid of streams of hot gases passing through and around the mass in the retort is applicable to only very few kinds of coal. Inasmuch as carbonization takes place in general in the retort portion of the apparatus, it is accomplished just as in the regular carbonization of coal in retorts through a kind of external heating, with the one difference that there is no firebrick heating wall between the heating flue and the coal being carbonized.

An additional difficulty that is encountered with many kinds of coal is that they remain adhering to the retorts. This phenomenon takes place principally in such coals which swell up markedly. The coal passes through the

(*Continued on page 52*)

Coke Oven Operation and Maintenance

F. J. PFLUKE

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THE subject of oven heating was covered in a general way in the last article of this series. We shall now consider more specifically the two principal methods of oven heating. The Becker oven is usually designed to be underfired with a high B.t.u. gas, such as oven gas or blue gas, or it may be designed to use either a high B.t.u. gas or low B.t.u. gas such as producer or blast furnace gas. In this article we shall consider such a combination installation and shall confine our remarks to producer and oven gas underfiring the use of which requires essentially the same methods as blast furnace or blue gas.

Producer Gas Heating

One of the primary considerations for efficient oven heating is the gas quality. It should be of uniform heating value and temperature and should be free from tar and dust.

Heating Value

The producers should be operated to furnish a gas of uniform thermal value. Large plants are usually equipped with a recording calorimeter for measuring the heating value but such equipment is expensive and requires constant supervision. By careful producer operation a uniform quality gas may be generated continuously. A simple check may be kept on the thermal value by analyzing the gas for CO_2 at least once every four hours. If producer operating conditions are maintained uniformly and the CO_2 content of the gas held at a constant amount the gas quality will be uniform and a calorimeter is unnecessary.

There is some difference of opinion among oven operators as to the proper composition of producer gas which will give best results. It is not our intention to argue the point in this article. The composition of the gas will usually be determined by the local operating conditions. Producer plants using large percentages of coke breeze, material thru a ½" screen, will find it necessary for maximum producer efficiency to carry a high saturation temperature producer blast which will produce a gas of approximately the following composition

CO_2	6.3%
O_2	0.1
CO	26.4
H_2	12.6
CH_4	0.7
N_2	53.9
B.T.U. per cu. ft.	134

A gas of this composition can be generated continuously with very little operating difficulty while attempts to reduce the CO_2 content by carrying lower a saturation temperature usually result in clinker trouble and varying quality gas.

Plants using nut or large size fuel for producer operation find the maximum producer efficiency under operating conditions which produce a gas of the following composition

CO_2	2.8%
O_2	0.2
CO	30.2
CH_4	0.2
N_2	57.5
B.T.U. per cu. ft.	128.4

Some very interesting tests to determine operating conditions resulting in maximum producer efficiency are outlined in the A.G.A. Proceedings of 1929 under the Report of Subcommittee on Producer Gas. It is recommended that producer operators study these tests and conduct similar tests on their own producers.

It is quite essential that each operator determine under his own local conditions the quality gas which gives him maximum overall efficiency and once this is determined he should insist that the gas composition be kept as uniform as possible. If this is done he will be rewarded by more uniform oven heating and better supervision of the heating operation which is possible if the heaters' time is not consumed in making changes in pressures and checking the changes to compensate for varying quality gas. When it is necessary to change the gas quality the heater should be notified in advance in order that he make his pressure changes before the flue temperatures are affected. In other words to insure uniform and efficient heating the producer operator must cooperate to the fullest extent with the heater.

Cleaning of Gas

Before entering the ovens producer gas should be thoroughly cleaned of dust and tar. This is usually accomplished by scrubbing with water in a direct contact cooler. The rate of water circulation should be sufficient to keep the tar and dust below 1.5 grains per hundred cubic feet of gas. If the gas is not thoroughly cleaned of both tar and dust, main stoppages will occur, the producer gas boxes at the inlet of the regenerators will accumulate tar which will affect the volume of gas to the ovens and dust will collect in the regenerators eventually causing serious stoppage. Under no circumstances should water circulation be cut in cold weather to raise the gas temperature in order to prevent ice formation in the mains. This procedure has actually been followed at several plants and serious regenerator stoppages resulted. If the producer gas main between

the scrubber and ovens is long and trouble is experienced with ice formation in the main it should be covered or steam introduced at the outlet of the scrubber to keep the gas temperature above the freezing point or both may be done.

Determination of Tar and Dust in Gas

It is advisable to test the gas for tar and dust content at least once a month. A very satisfactory apparatus for this purpose is distributed by E. H. Sargent and Co. of Chicago. The apparatus as shown in Fig. I consists of a heavy brass cylinder "(A)" for holding 94 x 33 mm paper extraction shells "B," which retain all particles of solid matter as gas is drawn thru them. The shell holder is heated by an electric heating sleeve "C" in order to prevent condensation from the gas.

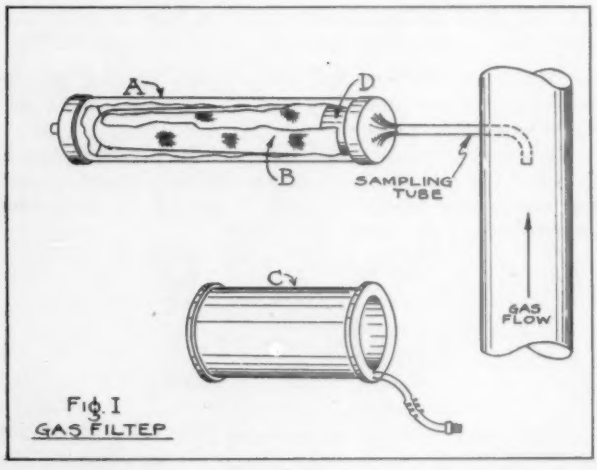


Fig. I
GAS FILTEP

The method of operation is to weigh one of the paper shells after it has been dried thoroughly and place it in the body of the apparatus, where it is held in place by contact from the inner and outer surfaces of the cone "D" and jacket "A." The filter is then connected to the sampling tube which consists of a piece of pipe bent at right angles and inserted in the gas pipe with the open end facing the gas stream. The sampling pipe should reach the center of the main. The motor driven pump "E" Fig. II is then connected to the outlet of the filter and gas drawn thru the filter at the rate of about 30 cu. ft. in 1½ hr. to 2 hrs. as measured by an ordinary gas meter "F."

After the test run the paper shell is dried again and then weighed. The difference between the initial and final weight is the weight of tar and dust. To determine the amount of dust the shell is washed with benzol to extract the tar after which it is redried and then weighed. The loss in weight represents the tar.

Combustion Control

The most important considerations after gas quality for proper combustion control are tight door jams and regenerator faces, and proper draft setting. Both subjects were quite thoroughly discussed in previous chapters. The actual regulation of the air gas mixture to obtain good combustion, and the adjustments necessary for proper heat distribution are relatively simple providing the heater understands the fundamentals of the oven design.

In the standard Becker oven the pressures at the top of the upflowing and downflowing regenerators practically are the same thruout the length of the oven. If the area of the gas and air ports at the inlet of each vertical flue is the same the quantity of gas-air mixture delivered to each vertical flue will depend on the area of the opening between the top of the vertical flue and the horizontal flue into which the gases from the individual flues pass. The quantity of gas-air mixture to any flue may therefore be varied by regulating the size of the opening into the horizontal flue which is accomplished by a sliding brick. The amount of gas-air mixture delivered to the flues also depends on the differential pressure between the top of the upflowing and top of the downflowing regenerators. We see therefore that in the standard Becker oven the gas-air mixture delivered to a vertical flue is proportional to the differential pressure between the top of the upflowing and downflowing regenerators and to the area of the horizontal flue port opening.

In setting the combustion it is advisable to run first for a few days with no sliding brick setting making observations on the coke temperature during this time. It will usually be found that the pusher side runs hotter than the coke side. This is due to the fact that each flue receives the same amount of gas-air mixture altho the amount of coal to be carbonized is greater on the coke side than on the pusher side because of the taper of the oven. It will therefore be found necessary to close down on the horizontal flue ports starting at the second or third flue from the coke side and tapering the area down as the pusher side flues are reached.

Due to radiation losses which cool down the ends, the ports of the end flues are usually left wide open. Since the pressure is the same at the top of the upflowing regenerator across the length of the oven, when some ports are partially closed the pressure will build up in the regenerator and more mixture delivered to the flues with the larger area ports. The volume of gas-air mixture delivered to the flues is then regulated by increasing or decreasing the stack draft which increases or decreases the differential pressure between the top of the upflowing and downflowing regenerators.

These adjustments should be made and observations on the coke appearance taken until the coke is of uniform and satisfactory temperature.

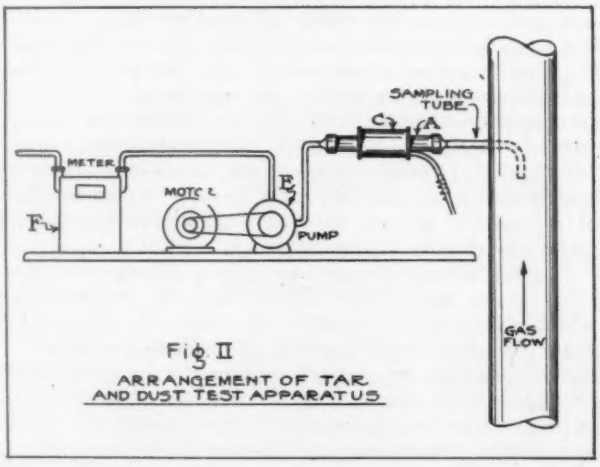


Fig. II
ARRANGEMENT OF TAR AND DUST TEST APPARATUS

In some of the batteries of short ovens it has been possible to eliminate sliding brick setting by designing the area of each gas and air port to give the proper amount of air-gas mixture for the flue. This makes the heating operation much easier than with a sliding brick setting.

The regulation of the gas air mixture for good combustion is quite simple. The amount of air is controlled by regulating the stack draft while the amount of gas is controlled by changing the gas pressure. Regulation of the amount of gas to the individual walls is accom-

plished by changing the amount of opening of the producer gas clapper valves. The mixture should be set to give a waste gas analysis of about 19% CO_2 and 2%$_2$. This analysis is made on a sample taken usually at the tops of the downflowing regenerators. The sample should be drawn into the Orsat apparatus thru a silica tube not less than 4 feet long inserted in the regenerator "peep" hole. While taking a sample the carbon caps should be closed and the "peep" hole sealed to prevent air being drawn into the sample tube. Whenever changes in stack and gas pressures are made a sufficient number of waste gas analyses should be made thruout the battery to insure the proper air-gas mixture.

After the correct combustion setting has been made further changes on individual walls should be relatively few. If combustion trouble is encountered on a wall the difficulty may usually be remedied by patching. The importance of constant patching cannot be too strongly stressed.

It is extremely important that the producer gas "boxes" should be inspected frequently. It is advisable to clean the clapper valves and pipe at least once a week to insure an unrestricted gas supply to the walls. Tar or dust building up in the pipe will restrict the gas flow and cause low heats. The gas and waste gas clapper valves and seats should be kept clean to insure proper seating gas of the valves, otherwise gas leakage into the waste gas flue may result, which will affect the flue temperatures and cause a high underfiring figure.

To insure proper functioning of all dampers at all times it is advisable to inspect the gas and air boxes frequently. It is the practice at Rochester to inspect each gas and air box for damper position after each reverse. Altho this requires an extra man it is felt that the expense is well worth while.

The heater should be required to inspect flues frequently. He should watch for abnormal temperature and pressure conditions, sliding brick or gas and air port brick out of place, door jam leaks in the end flues and regenerator leaks. Any leaks should be immediately patched as outlined in the first article of the series.

Safety Precautions

Because of the large amount of carbon monoxide in producer gas it is advisable to require two men to work together on any gas box repairs where producer gas may leak.

The heaters should thoroughly realize the danger of sucking air into the producer gas main in event the gas pressure fails due to producer trouble. In case the pressure drops to zero the reversing machine should be immediately run to the neutral position which will shut gas off the walls. The main producer gas valves to the individual walls should then be closed. If there is insufficient gas to maintain a pressure on the main steam should be turned into it. Before putting gas back on the battery the main should be purged out the bleeder at the end. Whenever producer gas is off the battery longer than one minute oven gas should be put on before producer gas is put back into the regenerators. If this is not done an explosive mixture may result in the regenerators due to air leaking into them. The heaters should clearly realize that producer gas must never be turned into a regenerator unless it is full of waste gas.

Oven Gas Heating

Efficient heating with oven gas requires the same careful draft setting and tightly patched regenerators as with producer gas. The gas should be of uniform thermal value and temperature, and should be as free as possible of napthalene. The means of combustion control by manipulation of stack draft gas pressure and sliding brick is much the same as with producer gas.

Oven gas heating requires a much more thorough flue inspection than producer gas heating. Gas and air port stoppages are very rare when heating with producer gas while gas nozzle stoppages are very common when using oven gas. Such stoppages may be kept at a minimum by using the carbon caps on the walls not burning. Air is pulled thru the nozzles and burns off any carbon formed during the burning period. Occasionally a nozzle will become completely plugged and in such a case must be "punched" with a steel rod.

When underfiring with oven gas the heater usually sets the combustion by eye. The gas air mixture is regulated until there is a faint wisp of smoke in the flues. After proper combustion setting has been obtained some flues may show smoky combustion. This is usually due to loose nozzles. Such difficulty may be easily remedied by grouting the nozzles giving trouble. The loose nozzles should first be well seated by tapping lightly with a tamping rod. With the tamping rod still covering the nozzle opening, about a pint of silica grout made by mixing water with clear silica cement to a consistency that will pour readily, is poured down the flue opening onto the nozzle. Under no circumstances should a high temperature patching cement be used as it will be impossible to remove the nozzle later.

Care of Flue Nozzles

If the smoky flue persists after grouting the nozzle a cracked gas gun block may be the cause. This may be repaired by pouring grout into the nozzle well until the leak is stopped. Care should be taken to prevent grout entering the nozzle by covering it with a tamping bar.

Frequently gas nozzles will be restricted by ash fusing over the openings and the flues cool due to lack of gas. In such cases punching is often ineffective and the nozzles should be replaced with new ones. Before putting the new nozzle into the flue it should be heated by leaving on the oven operating floor or heating in a hand forge. If a cold nozzle is put into a flue it will crack.

It is very important to insure the correct gas supply to each wall that the piping between the fuel gas main and gas "gun" be cleaned at least once a day. The piping should be fitted with tees to simplify the cleaning. A boiler flue cleaner of the pipe size is very satisfactory for this purpose. For cleaning thru the reversing cocks a "swab" should be provided with just sufficient clearance to pass easily thru the cock. If too small a "swab" is used the opening may be restricted by grease collecting in the opening.

The reversing cocks should be greased frequently to insure easy operation. The operating arms should be checked daily for adjustment making sure that the cocks open wide at each reverse.

When using oven gas for underfiring a combination oven, air is drawn thru both producer gas and air regenerators. The stack draft necessary for good combustion will usually be found to be so low that an excessive pressure will exist at the top of the upflowing regenerator. To correct this condition the stack draft should be raised and the air volume reduced by restricting the producer gas and air box openings by inserting pieces of sheet iron of proper size to give the correct air supply. These pieces of iron or so called finger bars are usually provided in various sizes starting with one inch so that easy adjustment is possible.

It has been found very helpful in securing good heating operation at Rochester to provide the heaters with report blanks covering the most important items of inspection. These reports are turned in daily and include the items listed in the following:

Duties of Heaters

The heater is responsible for the heat control of the ovens. The following are his duties:

1. He shall be responsible for the correct setting of the gas pressure and stack. He should check all pressures at least once an hour and in case any adjustment is necessary notify the heater helper to make such adjustments. All pressuring and stack draft settings will be posted.

2. He shall be responsible for checking the back pressure on collector mains, flush liquor pressures and collector main gas temperatures. All these should be checked once an hour and in case adjustment is necessary the oven foreman should be notified to make such adjustments.

3. The heater shall be responsible for the flue inspection as follows:

   a. When operating on oven gas each heater shall inspect *all* No. 1, No. 2, No. 12, and No. 13 flues once per shift. In addition he shall inspect one center flue on each wall once per shift. (When on producer gas inspect 1 and 13 flues in addition to one center flue per shift.)
   b. Each heater shall inspect every flue of 6 different walls each day so that every flue will be inspected once a week.

4. The flue inspection should cover the following:
   a Look for regenerator and jam leaks in end flues.
   b. Inspect all flues for position of bananna brick and sliding brick.
   c. Inspect all flues for loose and plugged nozzles.
   d. Inspect all flues for carbon in fuel gas wells.
   e. Inspect flues for temperature.
   f. Inspect flues for oven gas leaks.

5. The heaters on the 3-11 and 11-7 shifts will "shoot the heats" on all 3 batteries. Start 13 minutes after the reverse and do not take longer than 4 minutes for each battery. If you have not "shot" all the flues on one battery within the 4 minutes wait for another reverse to finish.

6. Each heater shall swab fuel gas crossarms, risers and into the main once each shift, on all the walls using oven gas. The heater helper will assist in this work.

7. Each heater shall inspect at least two times per shift all producer gas dampers, air dampers, waste gas dampers, fuel gas cocks, emergency gas cocks. Be sure that all dampers are opening and seating properly, fuel gas cocks are opening properly, emergency gas cocks are set properly.

8. Each heater shall inspect all reversing mechanism once per shift. This will include the reversing machines, cables, rods, weights, and interlocks.

9. Each heater shall inspect once per shift the tops of all regenerators thru the peep holes in the alleyway. He should watch for hot regenerators, fallen brick gas gun leaks when operating on fuel gas and be sure that at all times there is a slight suction at the "on" regenerator peep holes.

10. Each heater should inspect the regenerator wells once a shift for leaks. Also be sure all carbon caps are clean and are seating properly. Carbon caps should be set to open 2".

11. The heater is responsible for changing walls to oven gas heating or back to producer gas heating. He is responsible for the correct gas pressure and finger bar setting.

12. It is very important that the heaters realize the danger of a suction on either the producer gas or fuel gas mains. If there should be a suction air might be drawn in and an explosive mixture in the mains result. If due to some trouble outside the ovens the gas pressure should go to zero run the reversing machines into neutral immediately and put steam into the mains. The heaters should be thoroughly familiar with each point at which steam may be put into the mains.

13. When no oven gas is being used for underfiring a gas pressure of 1" should be maintained on the fuel gas main. This is controlled by the 2" bypass line around the main valve. The gas should be bled into the collector main thru the bleeder at the end of No. 1 battery which is tied into the collector main. When oven gas is being used this bleeder and the 2" bypass should be shut off.

14. It is very important that finger bars shall be kept in place whenever oven gas is being used.

15. With the exception of punching plugged fuel gas nozzles all other flue nozzle work shall be done on the day shift under supervision of someone from the office. Any flue tools should first be inspected to be sure they are in good condition, before being put into a flue. Any flue tools used should have handles on so that they cannot possibly fall into the flue. In case any metal should fall into a flue get in touch with someone from the office immediately.

16. The heaters should watch the reverses very closely and be sure that the proper walls are burning at all times. This can be checked either in the alleyway or on top.

17. The heaters should watch the coke pushed and check up on the cause of any green spots.

18. The heaters should watch the waste gas stacks and when smoke shows inspect for leaks the flues of the freshly charged ovens.

Natural Gas on the St. Lawrence

POSSIBILITY of development of natural gas and oil in large quantities on the south shore of the St. Lawrence River, in a well-defined belt stretching between St. Hyacinthe, P. Q., and a point opposite Three Rivers, P. Q., is seen in the entry of several large companies into the field as the result of reports made by prominent geologists during the past year. Indications of gas in sufficient quantities for commercial purposes have led a number of companies and syndicates to take up 500 square miles of land in the district. A detailed geological survey of the entire district, recently published, is reported to have stimulated the interest. No work has yet been commenced by any of the companies with present holdings, although it is expected the drilling material will be shipped in from the Turner Valley by one company.

The possibility of finding natural gas in the Trenton limestone has long been realized and attempts have been made to carry out oil operations. Five homes in the district are still heated and lighted by natural gas from a drilling reported to have been made in 1885. This has been considered a strong argument for the presence of an important reservoir.

Method Of Laying Gas Mains Through Embankments

Pushing culvert under railroad

THE laying of gas mains under an embankment, railroad tracks, street car tracks, etc., where open cuts cannot be made, tends to make the work much more costly. The jacking method of culvert or conduit placement, developed by the Armco Culvert Manufacturers Association, Middletown, Ohio, consists of forcing the culvert completely through the embankment without constructing an open trench.

The jacking of a culvert should proceed from the lower of the two sides of the embankment. This insures that the work will be well drained.

In preparing the site for the culvert installation, the first step is the excavation of an approach trench. This is merely an opening dug into the side of the embankment for entrance of the culvert. The depth to which this trench is dug into the embankment is largely a question of economy. It would not normally be good practice to excavate beyond the point where the estimated jacking rate would exceed the horizontal rate of excavation. The amount of material to be moved and backfilled and the extent of shoring required would also be factors in determining where to stop the trench.

Removing excavated material with narrow gauge track car and hoist

The width of the trench should be such as to permit the installation of the shoring timbers and provide sufficient room for the workmen in handling the pipe and making joints. At its inner end the trench should be given a clearance of 1½ feet from the outside of the pipe on all sides and for a length of 2 feet, to provide room for riveting additional sections of pipe as the jacking progresses.

Too much attention cannot be given the matter of adequately supporting the approach trench walls, as a progressive slipping of these walls and the fill behind them during the construction is sure to result in serious delays and may in some cases actually grip and hold the pipe to such an extent that further jacking is impossible.

Upon completion of the approach trench 6 x 12-inch guide timbers are placed in the bottom of the trench and firmly bedded on the line established for the center line of the pipe and parallel to its gradeline. This serves to support and guide the pipe on its correct gradeline and alignment while being jacked. In making the survey for the location of the culvert it is well to establish two permanent reference points between which a chalkline can be stretched and from which check measurements can be made from time to time during the progress of the work.

Ordinarily 36-inch diameter pipe is the minimum that will permit a man to excavate inside with any degree of comfort. However, smaller diameters have been jacked successfully. For pipe of this size, one 50-ton jack will be found to be sufficient. For larger diameters it might be found to be advantageous to use two jacks instead of one. This will facilitate the removal of the excavated material because a runway can be laid between the jacks. Local conditions, such as distance to be jacked and stability of the soil are leading factors in determining the size of the jacks to be used.

The amount of thrust or travel of the jack contributes much to the speed of the work. Jacks should

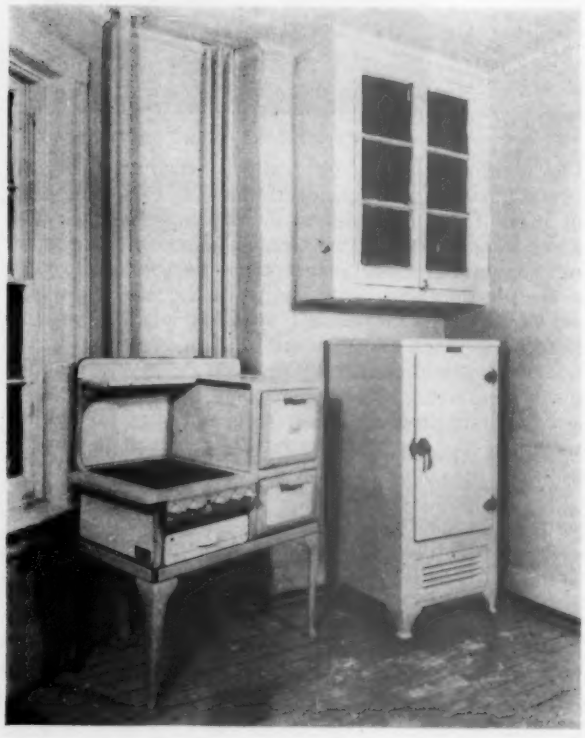
be selected which give at least two feet of travel in order to minimize the work involved and time lost rearranging the apparatus. If a hydraulic or oil jack is used it must be capable of operating in a horizontal position. When two or more jacks are used, it is apparent that they should be of equal length and speed of travel.

The illustration shows the arrangement of equipment and principal construction details for jacking a culvert through an embankment.

The actual jacking operation is started by excavating ahead of the pipe. As the excavation progresses the pipe is advanced by applying pressure with the jacks. Frequent checks should be made of the excavation which should be exactly to grade at the bottom of the pipe and allow approximately 1½ inches clearance at the top. For the larger diameters, wheelbarrows, run on planks laid in the bottom of the pipe, can be used for the removal of the spoil; for smaller diameters other means, such as boxes on small wagons or on skids, can be used.

When one section of pipe has been completely jacked into the embankment, another section is rolled into place on the lining timbers and riveted to the section already in place. Pipe ordered for jacking is already punched for riveting. This process is repeated until the required distance is jacked and the main can then be laid in the pipe.

A few years ago the Iroquois Gas Corporation, Buffalo, New York, installed a 42-inch corrugated culvert casing under a number of railroad tracks by this method. In that city it was found that the cost of completely installing the casing, including the casing itself, labor, timbers for miscellaneous material, an hourly charge for compressors, hoists and auxiliary equipment, has averaged about 60 per cent of the cost of 24-inch steel pipe casing installed under former methods of shoring and trenching.



Automatic gas refrigerator and modern gas range installation

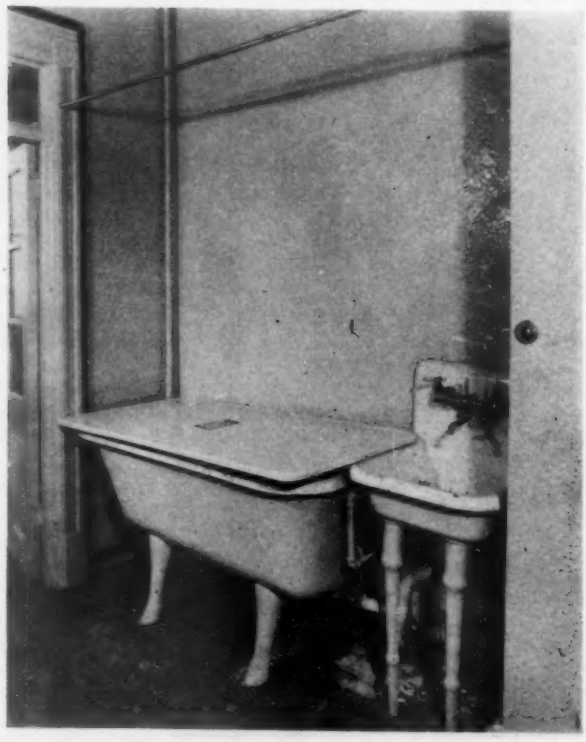
Modernizing Old Apartments With Gas Refrigerators

AUTOMATIC refrigerators before bathrooms—and in New York, too.

Extensive remodeling and modernizing of one of the city's older apartment dwellings, at 328 East 109th Street, included the installation of automatic gas refrigerators and new gas ranges—but the "improved" bathing facilities consisted only of a combination bath tub and laundry tub placed next to the kitchen sink.

By modernizing the eighteen four-room apartments in the building, the rental values were increased from twelve to thirty dollars a month, according to C. Morey Siegel, President of the New Holding Corporation, owners of the property.

Mr. Siegel's experience with gas refrigeration in his other apartments, on Riverside Drive and in other exclusive sections, led him to the conclusion that its low operating cost would also prove a renting feature for his older and less modern buildings. The installation of automatic gas refrigerators in addition to modern gas ranges were the principal items of the modernizing program.



"Combination" bath and laundry tub in kitchen

Ensuring Profits by Sound Rate Schedules

Pipe lines increase need of rates rightly fitted to househeating and industrial gas and effective in holding high-load-factor business.

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Consulting Editor, American Gas Journal

NEW FACTORS in rate making have been introduced by gas pipeline developments. Some of these represent essentially the placing of new emphasis on old factors which could in the past be more or less ignored. Others are radically new and require a radical sort of thinking for their correct appraisal. And early appraisal is important, for neglect of even the most novel of these considerations may result in undesirable precedent which will later be difficult to overcome.

Practically all of the new problems that confront the industry because of the introduction of natural gas center around the question of load factor. For the present discussion only this type will be considered. Hence it becomes very important first to define what one means by "load factor." It is not practicable to express such definition in a way that will make it universally useful. Yet, for clearness of discussion it is essential to take a certain definition as a basis and then show wherein modification of conditions may necessitate variation from the general conclusions that result from the first assumption.

Load factor is in all cases the ratio between average load and peak load. It is important, however, to determine whether the ratio is based on instantaneous, hourly, or 24-hour-day loads. In some cases the instantaneous load ratios are significant. Obviously, for the individual customer in rating meter and service-pipe limits it is essential to consider instantaneous maximums; to neglect them might result in momentary peaks of demand that are not provided for adequately, with consequent failure of satisfactory service.

Calculating Transmission Line Capacities

In other cases it is better to utilize ratios based on one-hour or on-24-hour totals, or even on the average for longer periods than this. In calculating transmission capacity of a distribution main the peak hour usually determines, because the diversity factor among the group of customers served from the main usually suffices to make the instantaneous peak loads a negligible consideration. Holder and transmission-line capacities are, on the other hand, best gaged according to 24-hour requirements, or even on the basis of the average per 24 hours for the peak three-day period of the year.

Since in this particular discussion it is desired only to consider the influence of natural gas and long-distance pipe-line supply on city systems, it is convenient to consider only that load factor which is calculated by taking the ratio between the average day and the maximum day of the year. By using this factor one is able to appraise with fair accuracy the significance for each class of customers of changing conditions in gas supply.

Calculated on that basis, the industrial establishment which operates regularly throughout the year with fairly uniform demands on the gas main usually has a very high load factor. It is not at all uncommon for such industrial customers to have a capacity-load factor of 80 per cent. The typical householder using gas for cooking, water heating, and a few incidental purposes has about a 40 per cent load factor. Commercial gas users, including particularly those doing commercial cooking, provide an intermediate type of load, perhaps averaging somewhere in the neighborhood of 50 per cent.

Those who do house heating with gas provide the worst load factor of all. When a central heating unit or other appliance is used regularly throughout the entire cold season, the load factor for space heating is typically about 33 per cent. When only auxiliary heating is done with gas, the load factor is often as low as 20 per cent, or even worse. The meaning of these load factors in fixing of rates becomes evident from a very simple calculation, the results of which are conveniently tabulated herewith.

Effect of Load Factor on Cost of Gas at City Limits

Hypothetical conditions assume cost of gas in the producing field of 5 cents per M and transmission cost from producing field to city gates of 20 cents per M on a theoretical 100-per cent-capacity basis

Type of Use	Load factor	Total gas cost at city gates
Ideal continuous use	100%	25 cents per M
Non-seasonal industry	80	30
Commercial	50	45
Regular house heating	33	65
General household	40	55
Auxiliary heating (seasonal)	20	105

This calculation shows that the cost of the gas varies widely according to the regularity of use. In the specific

and *purely hypothetical,* example chosen it is assumed that the gas in the producing field would cost 5 cents per M and that all charges for transmission of gas from the producing field to the gates of the city would be 20 cents per M if the operations were conducted on a strictly 100 per cent basis, that is, uniformly every day in the year at practically maximum line capacity. Obviously, the cost of the gas under such ideal conditions of regular use would be 25 cents at the gates of the city. The variation from this 25-cent base price according to conditions of use is rather startling.

Other Charges Included

It should be understood, of course, that there must be added to these figures for "cost of gas at the city gates" many other charges. They include those for distribution, commercial, new business, and management expense, and capital charges on distribution investment, working capital, and other capital not involved in the production or transmission of the gas to the city gates. These other charges, of course, vary also with the load; and in some cases the variation is almost as great as that here discussed for pipe-line transmission. However, it is desirable for the present to ignore all the others and simply study this item of cost of the gas at the city gates.

Rate schedules commonly provide *quantity* discounts or lower average prices for the large consumers. This is proper. Gas rate schedules seldom include a similar price adjustment for the *quality* customer who, because of regularity in use of gas, provides a higher load factor. The tabulation already presented shows that in some cases the regularity of use may be even more important to the supplying company than the quantity consumed. Actually, the big user of poor load factor is less desirable than the small regular user of gas. This fact should be taken into account more frequently and by larger adjustments than commonly prevail.

The electrical industry has recognized these considerations in the type of schedules which it offers to certain classes of long-hour and all-season power customers. Of course the electric men must in making up such schedules take account of the instantaneous load. They do so by placing demand meters or demand limiting devices on those circuits which require this type of control in order to prevent excessive loads not contemplated in the rate schedule of the particular customers. Some effort was made a few years ago to accomplish a similar result in the gas business. The idea has, however, not spread. It deserves much more attention than it has had. Of course this attention would be directed rather to peak-hour requirements or peak-day demands than to those instantaneous loads, which trouble the electric man.

In the gas business the Doherty three-part rate provided a scheme intended fully to meet the needs of all classes of customers. The customer's charge was constant for all classes. The demand charge varied according to the maximum consuming requirement of each individual customer. The commodity rate was then constant for all, regardless of quantity. Undoubtedly such a scheme would work satisfactorily if universally applied. It has, however, never been popular and usually has been made an auxiliary or optional rate and thus has not accomplished anything like its full purpose.

Typically, a gas-utility system as a whole has a capacity load factor of 40 to 50 per cent, say 50 per cent for the well managed company in a city of moderate or large size. Let us assume such a community has an average daily send-out of 20 million cu. ft. of public-utility gas. Let us assume that the diligence of the househeating department adds materially to the load through sale of auxiliary space heaters and central heating units. For simplicity's sake, let us assume that the increase in sales so obtained is equal to an average daily sale of 5 million cu. ft. of gas. The capacity-load factor of such new sales will probably be about 30 per cent.

What is the consequence on the system as a whole? The average sales are increased by 25 per cent. The capacity-load factor is reduced from 50 per cent to about 45 per cent. The required maximum of plant capacity increases from 40 million to nearly 55 million, or by nearly 40 per cent. Obviously, the gas company is worse off than before, because its average capital charge per M is increased, despite a substantial increase in sales. Such a situation demands strenuous effort to provide effective remedial measures.

Two types of customers are available to offset the disadvantage incurred through househeating loads. These are the high-load-factor industrial users and those special customers who are in position to take seasonal or off-peak gas. Suppose in the particular example just chosen that simultaneously with the marketing of 5 million cu. ft. per day on the average for househeating, the industrial department achieved an equal increase of sales among industrial customers, averaging say 70-per cent load factor. Then the increase from 20 million to 30 million total send-out would be accomplished without any change in the capacity-load factor. And the increase in required production and distribution capacity would be only in proportion to the increase in sales.

As a matter of fact, in many parts of the United States it is probably vital that managements put enough pressure behind industrial gas sales so that every time a new load of a million feet is accepted through househeating business there will be a like increase available from the industrial department. Only by such aggressive and properly balanced selling will the company maintain at least its present status. Without such aggressive selling the company will actually be slipping back in average load factor, with potential financial disadvantage to all the old classes of customers, as well as to the company.

Dump Gas Important Factor

Dump gas and off-peak gas represents new possibilities to most gas companies. With the development of large pipe lines they promise, however, to be a very important factor. Customers who will take such gas in low-load seasons should be sought diligently and can be encouraged to contract for gas at very favorable prices.

Let us go back to the first example of 5-cent gas in the field with 20-cent transmission costs on the 100-per cent load-factor basis. With those assumed conditions, offpeak gas costs almost nothing more at the city gate than it costs in the field. During the summer, for example, the maintenance of the pipe line and the operation of compressor stations is almost no more expensive when operating at practically full load than when operating at half the rated capacity. Certainly under conditions of the hypothetical example it would not cost to transmit additional gas in excess of 5 cents per M. Hence the cost of such off-peak gas at the city limits would actually be only ten cents.

In figuring the proper charge to off-peak customers the gas at the city limits can often be charged in at approximately this low figure. A few progressive gas companies have been able to take advantage of such

situations as this and sell substantial quantities of gas during the summer and other low-load seasons at rates that are extremely attractive to the customer, and yet adequate to return something to the company above operating expense.

One should rate a customer who, for example, may burn brick with the gas in the summer time, as having a capacity-load factor of 200 per cent or more. Such a customer, taking 2 million cu. ft. of gas per day for six months would actually be worth more to the company than another concern taking a like amount of gas regularly throughout the year at the same rate. Every effort should be made in each community where off-peak gas is available to secure enough such customers to fill in the valleys of the load curve as much as is feasible. Such a customer is of super quality and demands a super-favorable rate.

Quality-customer rate schedules, including provisions for off-peak and dump-gas customers, are much needed. It is not the scope of this article to propose them in detail. The points above outlined make it clear how such schedules can be beneficial to everyone, even including present customers. At the time when natural gas enters a community, either to replace or to supplement manufactured gas supply, is the ideal time at which to apply such new rate schedules. This means that during the next year or two there should be a very large number of such rate systems worked out scientifically and put into force for the betterment of public service and the stabilization of gas-company profits.

Some Factors That Affect Rates

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THIS article is not intended to treat of the various ramifications of rate-making problems, but rather to call attention to the merchandising activity of some of the leaders of the industry which has as its ultimate goal the leveling of send-out curves by means of not only the adoption of extremely low gas rates for certain classes of service, but by the intelligent selection of gas burning equipment.

Most gas men are thoroughly familiar with the value of the domestic gas refrigerator as a constant load, and most of them know something about the benefits gained by one of the outstanding companies as a result of making what seemed to some to be a cost rate on summer water heating for large office buildings.

Some few companies still do not have a house heating rate, although their physical equipment is adequate to permit them to take on considerable profitable business in this way. Among these companies are executives who have shrunk in horror from the apparently high winter peak loads of gas house heating, and among them are companies that are suffering from winter heating peak loads without the consistent six to eight months' load that goes with a well-designed gas fired central heating system.

These are companies that have somewhat actively merchandised the small gas heaters that are lighted with a match, and of course have devoted a lot of selling energy to gas ranges. The theory of these small gas heaters is that the home owner will use them in the Spring and Fall rather than fire up the coal furnace. Sometimes it works out that way, but in many cases there has developed a very different result.

What happens is this. Mr. Home Owner has put in a thermostat and by carrying a deep coal fire, can usually manage to keep that fire going from early Fall until early Summer, and just when we would like to have them working, these small gas heaters are standing idle. Along comes below zero weather, and since most furnaces are inadequate to heat comfortably during these severe spells, the housewife lights the gas heaters. If this will not quite do it, she is likely to turn on all of the range burners, particularly on a frosty morning while she is getting breakfast. Just when you can least afford to have it happen, Mrs. Housewife throws on for about an hour, enough gas to heat her house if it were burning in a properly designed and adequate central heating system. Then come the familiar complaints of "no gas" and the housewives agree at their bridge parties in the afternoon that "there isn't a bit of heat in the gas during cold weather" and "something ought to be done about it."

All the rest of the heating season when a good number of central house heating installations could be producing revenue building load, the plant and equipment is standing idle, ready to serve but with nothing to serve. What's the answer?

First of all, make a good heating rate, based on efficient low peak demand heating equipment. Employ some really high class house heating salesmen. They cannot be hired cheaply, not the real ones, and there is no place in the house heating picture for dubs. Let them sell your own company men first of all on the fact that health, cleanliness, and convenience place automatic, gas-fired, forced air conditioning systems alone as one of the biggest bargains in better living that exists today.

Advertise air-conditioning. Make every employee in your organization talk about it. Make them buy some systems and develop pride of ownership in them. Go after the load. Get it on the right basis and plenty of it, and if you can sell enough of your customers this full six to eight months' load, you won't even need to care whether your plant runs in the summer.

A rarely considered but important factor in the making of a house heating rate is the use of clock thermostats. Some of the companies who are doing an excellent job of house heating will not permit them to be installed. They sell their customer on the idea of a comfortable house day and night. The reason they discourage their use is that if 80,000 B.t.u. input is enough to heat a house at the low design temperature, 90,000 is all the gas they permit them to burn. You cannot do this if you install a clock thermostat, for the owner will carry a low night temperature. In the morning, coincident with a great deal of the cooking and automatic water heating load, these clock thermostats will throw over to day temperature. Unless you have provided a demand

of 125,000 to 140,000 B.t.u., the task of bringing the enormous weight of cold walls, furniture, and air up to the comfort point will be too great.

The air will become warm enough to possibly shut off the thermostat, but because the walls and furnishings are still cold, heat loss from the human body by radiation is so great that one cannot be really comfortable unless the setting of the thermostat is well above 75°. This high setting is not likely to be changed and the 20% more gas required to maintain 75° than is required to maintain 70° is responsible for complaints of high bills on the part of the owner. He not only tells you about these bills, but he tells all his neighbors; and most people today, even a great many gas company executives, do not know that it is possible to heat with gas at as low and in many cases at a lower cost than with coal or oil.

A lifetime of experience in the heating business and a great part of this devoted to selling gas heating equipment leads me to make the statement that too many companies are price conscious, i.e., they try to get gas heating load by offering bargains in cheap heating equipment. I have seen their salesmen try to sell a man a $400.00 gas furnace installation and report loss of business because the price was too high. The lucky bidder on the job sells the man a coal fired boiler and radiator job for $750.00 and right on his heels comes a good oil burner salesman and sells another $750.00 worth of oil burner, tanks, and miscellaneous control gadgets. This last set-up will probably not give more than five years' service,—ten at the very outside,—but the owner does not see this $75.00 to $150.00 a year cost. He sees merely the cost of the fuel oil that the smooth salesman guarantees will last him the winter through. If not, he will furnish the additional oil. Quite naturally, it usually lasts the winter out and the owner brags about his oil burner job and how much money he saved last winter.

I have touched upon but a few factors which affect rate making, but it must be obvious that a great many companies not only do not make their own rates, but their mode of procedure does not make it possible for them to do so.

Thermal Standards of Measurement for Town's Gas

Discussion of some facts relating to the 3412 B.Th.U. and the 4000 B.Th.U. selling units

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SINCE the writer suggested a smaller selling unit about six months ago there has been some controversy in regard to the most suitable size of selling unit to adopt—opposition to the principle involved being almost entirely of a passive nature.

Quite recently 4,000 and 3,412 B.Th.U. selling units have been adopted by the Halifax and Mossley Undertakings respectively and it is interesting to consider the relative merits of those measures from competition and standard of measurement points of view.

The sales appeal of the 100,000 B.Th.U. Therm has never been very material but we must recognise that it is our Board of Trade standard of measurement for gaseous energy. It is therefore imperative that any additional standards of measurement which may be created should bear a simple relationship to the existing standard. The original scheme outlined provided for a 5,000 B.Th.U. unit but Radiation, Ltd., indicated that 4,000 B.Th.U. would suit their purpose better for application to gas fire ratings. There was no great difference from a practical point of view between the 5,000 B.Th.U. measure and the 4,000 one, so the former was dropped.

Then the 3,412 B.Th.U. unit came into the picture and the gas industry is meantime confronted with the problem of deciding which of the two thermal measures is the most practical and the least confusing. The 3,412 B.Th.U. unit originated from a desire to have an exact copy of the electrical Board of Trade unit for competitive purposes.

Until the advent of the 4,000 B.Th.U. selling unit our old selling units were (a) 1000 cubic feet, and (b) 100,000 B.Th.U. These units bear the following direct thermal ratios to the electrical unit:—

(a) 145 to 1
(b) 29 to 1
} approximately

The thermal ratio of the 4,000 B.Th.U. unit to the electrical unit is:—

1.17 to 1

Apparently this is not looked upon as being near enough thermal parity with the electrical unit by the

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fastidious administrator (who in the past was seemingly indifferent to a much wider disparity). Consider for a moment the standards of measurement of electrical energy, having regard to the possibility of direct comparison with terms used in connection with town's gas.

Existing Standards of Measurement of Electrical Energy.

(1) A watt, or volt-ampere, is the amount of work produced during 1 second by a current of 1 ampere under an electromotive force of 1 volt.

(2) A Board of Trade Unit is 1,000 watt-hours. (This is the commercial unit and is known as a kilo-watt-hour; equal to 3412 B.Th.U.)

The electrical B.O.T. unit is a compound of energy and time and has been chosen to suit hourly flow of energy to common types of apparatus. With a 5 K.W. electric heater and a supply of 250 volt current the amperage required per hour (full on) is $\frac{5 \times 1000}{250} =$ 20. It is apparent that the relationship between the B.O.T. unit and the corresponding quantity of electricity is a simple one and thermal input is quickly obtained by multiplying the rated capacity of any appliance by 3412 B.Th.U.

The existing standards of measurement of gaseous energy may be summed up as follows:

(a) The Cubic Foot is the unit of quantity or volume.

(b) The gross Calorific Value is the total potential heat contained in one cubic foot.

(c) The Therm is the Board of Trade unit equal to 100,000 B.Th.U.

Of course the Therm is the existing commercial unit and is a *Calorific Value x Volume* compound in which the factor of time has so far not been considered necessary.

Potential Thermal Measurement

Therefore it may be said that the gas industry is in need of a standard hourly rate of potential thermal measurement. This could be stated basically as "x" cubic feet of "y" calorific value gas utilised in "z" time. Alternatively the hourly measure could be simply a convenient fraction of the 100,000 B.Th.U. therm. By subdividing the therm metrically a compromise to the ideal would be obtained, but the 10,000 B.Th.U. unit is just too large, and the 1,000 B.Th.U. unit just too small, from a comparative point of view.

If the 3412 B.Th.U. unit were adopted as a standard thermal measure of town's gas it would be necessary for Declared Values to be simple multiples of 3412 in order to avoid unnecessary confusion.

For example an Undertaking declaring a Calorific Value near 500 would have to be content with a compromise as will be seen from the following:

3,412 × 150 = 511,800 B.Th.U. = 1,000 Cubic feet :: 1 cubic foot = .15 units = *511.8 B.Th.U.* (declared value) further 1,000 cubic feet = 5.118 Therms or 1 Therm = 195.39 Cubic Feet.

The price of this new unit of 3.412 B.Th.U. with gas at 9d. per therm is worked out below:

100,000 B.Th.Us cost 9d.
1 " " 9d.

$$3{,}412 \text{ " " } \frac{9^{d.} \times 3{,}412}{100{,}000} = .30708^{d.}$$

It will be seen that if the price per therm or per 1,000 cu. ft. is a round figure the price per 3,412 B.Th.U. unit is a troublesome decimal fraction. The determination of cubic feet from units means dividing the number of units by .15 which is not a very convenient divisor.

If a 4,000 B.Th.U. unit is adopted then the following relationships exist to cubic feet and therms, considering 400 and 500 Declared values as examples:

400 C. V. Gas			500 C. V. Gas		
Therm	Units	C. Ft.	Therm	Units	C. Ft.
1	25	250	1	25	200
.04	1	10	.04	1	8

Cost of Unit @ 9d per Therm = .04 of 9d = .36d

Cost of Unit @ 3/– = per 1000 c. ft. $\frac{10}{1{,}000}$ of 36d = .36d

Cost of Unit @ 9d per Therm = .04 of 9d = .36d

Cost of Unit @ 3/9 per 1000 c. ft. $\frac{8}{1{,}000}$ of 45d = .36d

A glance at the above tables shows that the choice of a round figure unit considerably simplifies relationship and renders calculation easy, while declared values are not in any way affected.

A further advantage of this simple unit is that volume may be readily determined from a number of units, for example:

400 C. V. Gas (or 10 c.ft. per unit gas)	**500 C. V. Gas (or 8 c.ft. per unit gas)**
1 unit = 1 × 10 = 10 c. ft	1 unit = 1 × 8 = 8 c. ft.
5 units = 5 × 10 = 50 c. ft.	5 units = 5 × 8 = 40 c. ft.
100 units = 100 × 10 = 1000 c.ft.	100 units = 100 × 8 = 800 c. ft.

The simplicity of the above calculations leads one to believe that the Calorific Value of town's gas could with advantage be reported as "x cubic feet equal 1 unit" in place of "x B.Th.U. per cubic foot." In conjunction with a complementary 4,000 B.Th.U. unit the above suggestion facilitates the *hourly* rating of gas apparatus (and the costing) as follows:

> A gas fire rated, stamped and catalogued as a 6 unit heater would take 6 × 10 = 60 c. ft. of 400 C.V. gas per hour, and 6 × 8 = 48 c. ft. of 500 C.V. gas per hour full on. The running costs are 6 × .36d = 2.16d per hour in both cases with gas at 9d. per therm.

The true running cost is therefore available with a minimum of calculation and this provides a powerful competitive weapon. Knowing the price per unit together with the stamped rating of an appliance even the man in the street can readily arrive at the running cost of any gas appliance from a lighting burner to a furnace.

The comparative costs of the 3,412 and the 4,000 B.Th.U. units with gas at 9d. per therm are: .30708d. and .36d. respectively, a difference of only .05292d. in favour of the 3,412 B.Th.U. unit.

Name for New Measure

The possibilities of the 3,412 and the 4,000 B.Th.U. selling units have been pretty fully dealt with above but apart from referring to them as "units" no proper name has been specially applied to either. Certainly if 3,412 B.Th.U. was to be finally selected the Gas Industry might be justified in calling the new measure a "gas unit" but it is doubtful if the application of either the measure of 3,412 B.Th.U. or the name "unit" to gaseous energy is to be commended. The gas industry is in a strong enough position to give a lead in regard to an accurate selling measure for energy rather than to slavishly follow the electrical standards. The creation of a new thermal-hour or energy-time compound, as a complement to the 100,000 B.Th.U. Board of Trade unit seems to be a more practical suggestion. This new thermal-hour measure of gaseous energy could be known

as a "therm-hour" and would be equal to the combustion of 4,000 B.Th.U. of gas over a period of one hour.

The necessity for employing the time factor is just as apparent when dealing with gaseous energy as it is when dealing with electrical energy. When comparing the two industries' methods of measurement it is helpful to reckon amperes of electricity as similar to cubic feet of gas and volts as calorific value, e.g.

Electricity	Gas
Amps. × volts = Watt Hours	Cubic Feet (per hour) × Calorific Value = B.Th.U. per hour
1000 Watt hours = 1 Kilowatt hour	4,000 B.Th.U. per hour = 1 Therm hour

Suggestions have been made that the National Gas Council should give the question of the smaller unit serious consideration. This step would be opportune—there is need of a clear lead being given in questions of such fundamental importance to the Gas Industry.

Should the National Gas Council have the question of measures for gaseous energy under review they could do the Gas Industry a great service by collating the standards of measurement as applied to town's gas in suitable form for inclusion in future editions of engineering handbooks.

The flutter caused in Electrical circles when the 4,000 B.Th.U. measure of gas was adopted in Halifax—if the editorial remarks in an electrical journal are any criterion—should act as a spur in the flanks of the Gas Industry to hasten the general adoption of a standard small selling measure as a complement to the existing Board of Trade Therm.

Complete Gasification of Coal

(*Continued from page 40*)

retorts until a certain temperature is reached, at which it is converted into the plastic condition. An intensive evolution of gas takes place at this temperature and the soft mass of coal is broken up; the coal swells up and the volume becomes greater. The mass of coal presses up against the walls of the retort and the coal adheres to them. When coals, which swell up and cake and hence make it difficult for the hot blue gas to pass through and around the mass, are used, they must be mixed in certain proportions with coke. Most coals can be used without any difficulty with the addition of twenty to thirty per cent of coke.

An additional cause of the poor results obtaining from the gasification process is the hard and only slightly reactive coke. Even when good carbonization takes place, the coke, obtained from many coals is caked in such a manner, that it forms a solid, rigid column in the generator. The difficulties that arise from this phenomenon are similar to those that have been described above. The space in the generator near the walls is inadequately filled with coke and this section of the shaft offers only a very slight resistance to the passage of air and steam as compared with the rest of the mass of coke in the generator. Such coals, whose volatile constituents are easily evolved at lower temperatures, are better suited for use in the complete gasification apparatus. The heat in the retort is not sufficient to drive out completely all the volatile constituents of the coal, even when the carbonization process is prolonged, when such coal yields up its gas and tar only at relatively high temperatures.

The less the volatile constituents, that is the gas and tar in comparison with the fixed carbon or coke in the coal, the lower the heating value of the coal gas that is manufactured from it. It is just as important that the coal gas should have a high thermal power. The higher the B.T.U. per cubic foot in the coal gas and the more tar can be cracked in a closed superheater for the production of oil gas or tar gas, the higher will be the thermal value of the mixed gas obtained from the complete gasification process. (An interesting article relative to this phase of the subject is contained in Das Gas und Wasserfach, 1929, pages 1258ff.).

It is essential that the ash in the coal should possess a high melting point. The same difficulties arise from molten clinker as occur in the producer gas or blue gas process, that is, bridging of masses of clinker, adherence of clinker to the walls of the apparatus and the like (See Glueckauf, 1928, pages 1733 ff). An investigation of the properties of the ash as has been carried out by Bunte and Baum (see Das Gas und Wasserfach, 1928, pages 97 f f and 1929 pages 832 ff), will avoid disagreeable surprises in the gas making process. As far as the size of the pieces of coal is concerned, it has been found that best results are obtained with coals containing pieces varying in size from two to three and one half inches. Smaller sized coals, pieces from about half an inch to two inches, are also suitable. The pieces of coal should be uniformly sized and the coal should not contain any fines. The moisture in the coal must not be too high, for heat is consumed in the vaporization of this water and this heat must be furnished at the expense of the thermal economy of the process.

(*Continued in March Issue*)

Bituminous Trading Quiet in December

QUIETNESS marked the demand for domestic lump in the bituminous markets of the country in December. This condition resulted in numerous curtailments in production, with the result that intermediate sizes—egg and nut in particular—moved into a much stronger position than they have occupied in recent months, *Coal Age* reports. Reduction in output also decreased the available supply of slack and screenings to a point where it failed to come up to the demand. Consequently, price increases on these sizes were reported in a large majority of the consuming centers.

December production of bituminous coal is estimated at 39,716,000 net tons, an increase of 1,054,000 tons over the November output, and a decrease of 7,330,000 tons from the total in December, 1929. Anthracite production is estimated at 6,150,000 net tons for December, which compares with 5,207,000 tons in November and 7,377,000 tons in December, 1929.

Shippers of the country, through estimates submitted to regional advisory boards, anticipate a decrease of 3.8 per cent in the shipments of coal and coke in the first quarter of 1931, as compared with the total in the same period last year. Total carloadings of coal and coke for the first quarter are expected to be 2,379,632, against the 1930 figure of 2,473,227.

The *Coal Age* Index of spot bituminous prices (preliminary) for December settled at 146¼, as compared with 147 in November. Corresponding weighted average prices were $1.77¼ in December, against $1.78 in November.

In spite of cold weather, the country's anthracite markets went through a quiet month in December. Demand for stove and egg was light. Chestnut, on the other hand, had a good month.

The Relation of Humidity and Temperature to Comfort

W. E. STARK.

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A HEATING system is not an end in itself; it is merely a means to an end. That end is comfort. There are exceptions to that rule; as when the purpose of a heating system may be to maintain a condition which, although decidedly uncomfortable to the occupants of the heated space, may be necessary to the attainment of conditions suitable for certain manufacturing processes. In general, however, the sole purpose of a heating system is to produce a comfortable condition. In a residence, bodily comfort is a requisite for the general happiness and well being of the occupants. In a manufacturing plant or in offices, bodily comfort is a requisite for maximum efficiency of the employees.

How can bodily comfort be defined? In what words can the sensation of comfort be expressed? Disregarding dictionary definitions, it would seem that the sensation of comfort might best be defined as "absence of sensation." To a person at rest in a heated space, a positive sensation of warmth or a positive sensation of coolness alike cause an awareness of discomfort. So too, do positive sensations of air motion, dryness, dampness; or odors, vitiation, or pollution. Comfort is characterized by complete absence of sensation.

When a person says he "feels comfortable," he really means that he does not "feel uncomfortable," or he means that he has no feeling at all, unless it be by contrast with a feeling of discomfort experienced in the quite immediate past.

In working to establish a condition of comfort, what factors must be considered as contributing to that condition? The factors entering into the solution of the problem are three: Temperature, humidity, and air motion. With a proper balance between those three factors, positive bodily sensations disappear and comfort ensues. It would appear, however, that something other than air temperature, or the temperature indicated by a thermometer suspended in the inhabited space, must be taken into account. The temperature of surrounding objects, such as walls and other materials having thermal capacity, must also be considered.

Bodily Heat Production and Heat Loss

The human body provides the scene for many complicated chemical processes. Oxidation of the food that is eaten produces heat; the generally accepted values for the rates of heat production being as follows:

Man at Work	**794 B. t. u. per hour**
Man at rest	**397 B. t. u. per hour**
Youth	**357 B. t. u. per hour**
Infant	**103 B. t. u. per hour**

The sweat glands produce moisture, which surrounds the entire body as an envelope. Evaporation of this moisture provides a cooling means for the body; for the heat to bring about the evaporation is drawn from the skin with which the moisture is in contact. Contact with warm air accelerates the action of the sweat glands, producing more moisture available for evaporation and for the consequent production of cooling effect. Evaporation of the moisture envelope is accelerated by air currents, leading to the well known cooling effect of a breeze or current of air. The rate of evaporation of the moisture from the surface of the body is affected not only by rate of air motion but also by the humidity, or moisture already in the moving current of air. If the surrounding air currents are already well laden with moisture, their capacity to absorb moisture from the body, with the consequent cooling effect, is limited. If those same surrounding air currents are devoid of moisture, their moisture absorbing capacity, with the consequent cooling effect, is augmented.

The human body loses heat by evaporation, convection and radiation. The loss of heat by evaporation has already been discussed. Moving currents of air in addition to abstracting heat from the body through the absorption of a portion of the moisture envelope surrounding the body, also absorb heat from it by direct conduction from the body to the air; this heat being dissipated by natural or artificial convection currents. The body itself, if warmer than the surrounding air, will set up convection currents.

Heat Loss Through Radiation

The body, in addition to being an evaporative surface, —a wet bulb thermometer, as it were—and a heater for convection currents, is also a radiator. If the body is cooler than a nearby object, such as a warm radiator, it will absorb radiant heat directly from that object. On the other hand, if the body is warmer than a nearby object, such as a cold wall or a cool radiator, it will just as surely give off heat to those cooler objects. It can on occasion be a radiator on its own account.

As the temperature of the air and of nearby objects and walls increases, the rate of bodily heat loss by convection and radiation decreases. The body, therefore, attempts to maintain a balance between the rate of bodily heat production and bodily heat loss by producing increased quantities of perspiration, available for evaporation and consequent cooling. When the combined rate of heat loss through convection, radiation, and evaporation is less than the rate of bodily heat production, uncomfortable warmth results. When the combined rate of heat loss is greater than the rate of heat production, uncomfortable coolness results. When the rate of heat loss exactly equals the rate of heat production, there is no sensation and comfort ensues.

Expressed mathematically, for comfort:

$$H_e + H_c + H_r = H_b \qquad (1)$$

where H_e = heat loss through evaporation
H_c = heat loss through convection
H_r = heat loss through radiation
H_b = bodily heat production (all in unit time)

An inspection of this equation reveals that there may be a seemingly infinite number of combinations of the separate rates of heat loss that can produce the sensation of comfort. An increase in one rate can be cancelled by

a corresponding decrease in another rate, leaving the balance undisturbed. For example: if at the same time that a decrease in surrounding air temperature causes an increase in the rate of heat loss through convection, a simultaneous increase in the humidity of the surrounding air causes an equal decrease in the rate of heat loss through evaporation, the balance is preserved. Every day experience on a summer day shows that the higher the humidity the less comfortable a person feels at a given temperature.

Effective Temperature

There must therefore exist certain combinations of temperatures and humidities which produce the same combined rate of bodily heat loss, and consequently, the same sensation of warmth or coolness. Points indicating such combinations of temperature and humidity for a given sensation may be plotted on a psychrometric chart and lines drawn through them, giving what may be termed "lines of equal comfort."

It has been determined, for example (see publications of the American Society of Heating and Ventilating Engineers), that in still air a normally clothed person experiences at a dry bulb temperature of 70 degrees and a relative humidity of 34 per cent, a degree of comfort equal to that experienced at a dry bulb temperature of 68 degrees and a relative humidity of 60 per cent. A line drawn between those two points plotted on the psychrometric chart goes through other points of equal comfort. Other lines, substantially parallel to the first line, go through points corresponding to equal degrees of undue warmth or undue coolness. (See Figure I.) Since each of these lines going through points covering a wide range of dry bulb temperatures and relative humidities corresponds nevertheless to a stated degree of comfort, the need for a new scale of temperatures, or a comfort scale, becomes apparent. Such a scale has been devised, known as the "effective temperature" scale.

Figure 1 shows effective temperature lines plotted on the psychrometric chart. On this chart the lines which are inclined least from the vertical correspond to the effective temperatures; while the other lines are the usual dry bulb, wet bulb, and relative humidity lines normally appearing on the chart. Note that the chart of Figure 1 is for persons normally clothed and in still air. For this condition the effective temperature line intersects the saturation curve at a value equal to the effective temperature. In other words, at a given effective temperature, that is, under a condition of dry bulb temperature and relative humidity corresponding to a given effective temperature, one feels exactly as comfortable as he would in saturated air at a temperature corresponding to the effective temperature in question.

It has been found that 50 per cent of the people feel comfortable over an effective temperature range of 62 to 69 degrees. This range is indicated in Figure 1 by the shaded area and is known as the "comfort zone." It has further been found that 97 per cent of the people experimented with, when at rest, are comfortable at an effective temperature of 64 degrees. This temperature is called the "comfort line." Persons working feel comfortable at lower effective temperatures, because their rate of bodily heat production is thus increased, calling for a lower effective temperature in order to effect a corresponding increase in the rate of heat loss. For persons doing light work, an effective temperature of 62 degrees seems to be most comfortable; while for persons doing hard work, an effective temperature of 60 degrees seems to be best.

It is interesting to consider equation (1) in the light of the effective temperature chart. The lower portion of an effective temperature line indicates a condition of high dry bulb temperature and low humidity. **Hc** and **He** have certain values. The upper portion of the same line indicates a condition of lower dry bulb temperature and higher relative humidity. Due to the lower dry bulb temperature, **Hc** is increased; but due to the higher relative humidity, **He** is reduced, thus preserving the balance necessary for the maintenance of the comfortable condition.

The effective temperature chart does not take into account radiation, either from or to the body. Radiation can have a noticeable effect on bodily comfort. With an effective temperature of 65 degrees for example, the immediate proximity of a cold object to which the body can radiate heat may result in a condition of discomfort; because to the values of **Hc** and **He** called for by the prevailing effective temperature condition, an unduly high value of **Hr**, or loss due to radiation, is added. An example is the seeming cooling effect of cold walls or a stone cold radiator in a room where the air temperature and relative humidity are of the proper values to produce comfort. Conversely, a source of radiant heat to which the body is exposed, can produce the sensation of bodily comfort, although the effective temperature may be below that required for comfort. As an example, we have the effect of the panel method of heating, practiced in Great Britain.

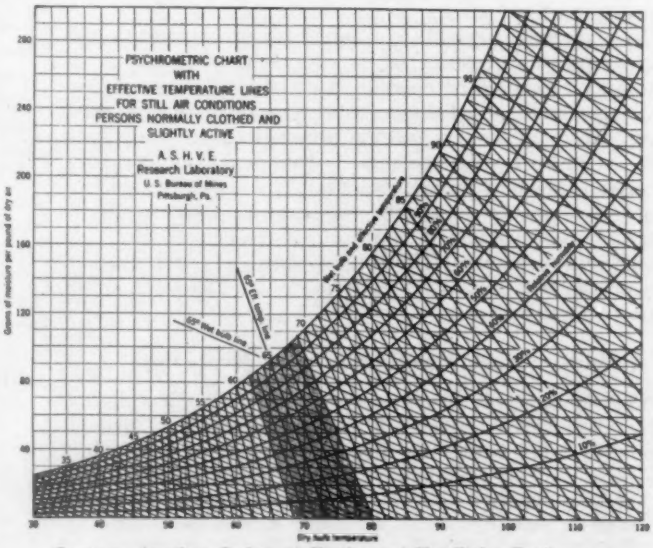
Moving Air and the Comfort Line

The equation of the maximum comfort line for still air (65 degrees effective temperature) is approximately expressed as follows:

$$R = 12(73 - t_d) \qquad (2)$$

where R = relative humidity
t_d = dry bulb temperature

Experiment shows that for conditions other than still air the effective temperature lines and the comfort zone are displaced to the right on the psychrometric chart and that the actual temperature of saturated air is no longer equal to its effective temperature. It is readily apparent that as the air velocity past one's body increases, a higher actual air temperature will be necessary in order to produce a certain degree of comfort.



Courtesy, American Society of Heating and Ventilating Engineers

Figure 1.

The equations for the maximum comfort line (65 degrees effective temperature), for conditions other than still air are as follows:

100 ft. per min. velocity	$R = 12. (75.2 - t_d)$	(3)
300 ft. per min. velocity	$R = 14.6 (77.9 - t_d)$	(4)
500 ft. per min. velocity	$R = 14.6 (79.7 - t_d)$	(5)

While not strictly accurate, these equations check the psychrometric chart closely enough for practical use.

Figure 1 seems to indicate that for any dry bulb temperature ranging from 65 to 73, there is a certain relative humidity which taken in combination with that dry bulb temperature, will result in the sensation of comfort. Does this indicate that any point on the 65 degree effective temperature line is a suitable condition to maintain in living quarters? It does not establish such a rule.

It is well known that extremely low relative humidities in living quarters not only have a damaging effect on furniture, due to absorption of moisture from it, but that they also have a drying or parching effect on the respiratory tract, leading to susceptibility to colds. It is also well known that extremely high humidities in living quarters cause condensation on walls and windows, leading to a general sensation of dampness and clamminess; as well as having certain physiological effects which are not yet well known. For these reasons, it appears that humidities in living quarters should be maintained at a value between 30 per cent and 50 per cent, with 40 per cent or slightly less being a suitable figure to strive for.

There seems to be a belief that due to the possibility of securing comfort at lower temperatures when an adequate relative humidity is maintained, it becomes possible to make a great saving in heating cost by lowering the temperature a few degrees and raising the relative humidity a corresponding amount. This is decidedly not the case. It is true that when the dry bulb temperature of the air is reduced, the heat loss due to transmission through the walls is lowered. This reduction in heat loss is, however, fully balanced by the added heat necessary for the production of the water vapor required to humidify the fresh air which must necessarily be admitted for ventilation. These statements can be proven mathematically.

The saving due to the maintenance of adequate humidity in living quarters is not in fuel cost, but in costs for medical attention due to colds and for repairs on wooden furniture. Extremely low humidities can even be damaging to the timber portions of residence construction.

In view of the conclusive data that have been gathered showing the definite relation existing between temperature, humidity, and comfort, and in view of the well known deleterious effects of extremely low humidities, it is not difficult to appreciate the desirability of having a heating system under positive control and provided with equipment that will maintain humidities within the proper range (30 to 50 per cent). Neither is it difficult to appreciate the superior comfort and health producing properties of complete and automatically controlled heating, ventilating, and air-conditioning systems for public buildings, particularly schools, as compared with the open window scheme of ventilation which has been the subject of so much propaganda in recent years.

New York Finds Smaller Homes Adopting Gas Househeating

THE small six and seven room house in the metropolitan and suburban area is following the more luxurious residence in adopting automatic heating methods, according to figures made public recently by the Consolidated Gas Company of New York.

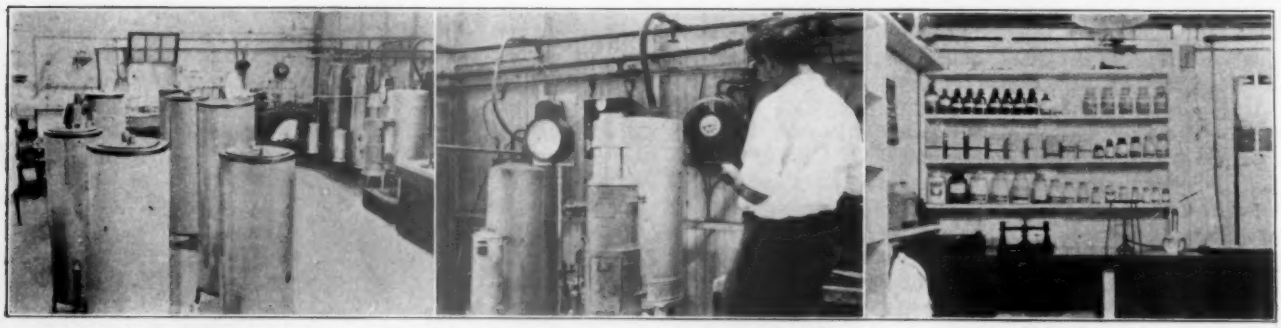
On January 1, 1930, in the territory served by the Consolidated and its affiliated gas companies, the average house using gas for heating contained 630 square feet of radiation. On October 1 following the reduction in gas heating rates in August, this figure had dropped to 567 square feet, indicating the installation of gas heat in many homes of the smaller type. The same trend was apparent in the territory served by the Westchester Lighting Company, where the figure of 600 square feet on January 1 decreased to 571 square feet on October 1.

During this period, there was an increase of more than thirty-five per cent in the number of gas heating installations in the territory served.

N. T. Sellman, director of sales and utilization of the company, expressed the opinion that two causes were primarily responsible for the recent adoption of automatic heat by the smaller type of dwelling.

"The reduction in the gas rate for heating made on August 1 undoubtedly has brought this service within the reach of additional customers, many of whom live in houses of the more modest type and size," Mr. Sellman said. "The other influence is the growing realization on the part of many home owners that the small, servantless home needs automatic heat just as much as the larger home, where the added comfort and convenience of automatic heating methods has been demonstrated.

"Since August 1 to the middle of November, nearly 450 house heating installations have been sold by this company and its affiliated gas companies, serving Manhattan, Bronx, Westchester County, and portions of Queens. On November 1, there were more than 2150 homes heated with gas in the territory served."



The Modern Appliance Manufacturer realizes the benefits to be gained by way of a Research Laboratory

Mixed Gases and the Appliance Manufacturer

ALBERT F. CRAVER
Engineer, The Cleveland Heater Company

RECENTLY developed natural gas fields in the South and West, and the opportunity which mixed gas gives to the gas companies to increase their number of meters, offers the gas appliance manufacturer an unprecedented field for extensive sales. However, these new conditions bring to the appliance manufacturer perplexing problems that before have not had to be considered. It is the purpose of this article to discuss the above problems, not from the technical side but from a practical viewpoint, as of special interest to the appliance manufacturers.

Of the commercial gases, natural gas is probably the hardest to control. This is due, of course, to the constituents that make up the gas and to the percentage of such constituents present. The variation of any constituent will naturally change the characteristic of the gas. It is obvious then that any fuel which will produce definite characteristics of combustion must be constant in its composition. If the fuel varies in its original make-up, it will necessarily vary in the way it burns, and will produce variable conditions in the appliance, so that such a fuel would be unsatisfactory in its effective application to any domestic gas appliance.

Mixed Gas Characteristics

A representative natural gas might give the following analysis as to its composition.

Carbon Dioxide	(CO_2)	= 0.2%
Illuminates		= 0.8%
Oxygen	(O_2)	= 0.5%
Methane	(CH_4)	= 75.0%
Ethane	(C_2H_6)	= 20.0%
Nitrogen	(N_2)	= 3.0%
Heating Value		= 1125 B.t.u.
Specific Gravity		= 0.67

We now find gas companies taking the above natural gas and mixing it either with manufactured gas or coke oven gas. A resulting mixture may be composed as follows:

Carbon Dioxide	(CO_2)	= 3.0%
Illuminates		= 6.8%
Oxygen	(O_2)	= 0.5%
Hydrogen	(H_2)	= 27.0%
Carbon Monoxide	(CO)	= 25.0%
Methane	(CH_4)	= 27.4%
Ethane	(C_2H_6)	= 6.0%
Nitrogen	(N_2)	= 4.3%
Heating Value		= 700 B.t.u.
Specific Gravity		= .73

Due to the addition of Hydrogen and Carbon Monoxide and to the lesser amounts of Methane and Ethane, the flame characteristics are changed, thus affecting the operation of the appliance. The important question then arises; How far can the gas be mixed before it is necessary for either the gas company supplying the gas, or the appliance manufacturer, to make corresponding changes in the appliance?

Factors Governing Appliance Operation

The operation of any appliance is controlled by definite chemical and physical laws. These have their foundation in the kind of gas used, and the condition under which they are burned. When the appliance is installed, it is adjusted to operate efficiently under normal conditions. To keep this efficiency, and to operate safely, the conditions must not vary. If they do vary, it must be within certain limits, otherwise the appliance, whether it is a water heater or a stove, will be unsafe and will not operate efficiently.

Any of the following commercial gases may be mixed

in various quantities to get the desired proportion of mix.

Gas	Heating Value	Specific Gravity
Natural Gas	*1100 B.t.u.*	*0.65*
Coal Gas	*575 B.t.u.*	*0.42*
Oil Gas	*575 B.t.u.*	*0.35*
Coke Oven	*550 B.t.u.*	*0.38*
Carburetted Water Gas	*550 B.t.u.*	*0.66*
Blue Gas	*300 B.t.u.*	*0.57*
Producer Gas	*150 B.t.u*	*0.86*

Whether or not any of the above gases may be satisfactorily used in a mixture will depend to a great extent upon its proper application, the correct appliances, and upon the limits to which the various mixtures may be taken. Automatically controlled appliances have done much to increase the use of gas, but they have also made it mandatory for the gas company to maintain certain standards in the quality of gas being supplied, otherwise a great deal of service trouble will appear, so that these mixtures become more of a nuisance and a hazard rather than a convenience.

Just as the manufactured gas companies had to discard a lot of old ideas when electricity began to be used commercially, so the appliance manufacturer will have to take a different attitude than that a gas burner will burn any kind of gas and do it efficiently without corresponding changes.

After a period of tests it was found that these mixed gases may be divided into three groups.

1st. Group—A mixture whose B.t.u. value is between 1100 and 900.

2nd. Group—A mixture whose B.t.u. value is between 900 and 700.

3rd. Group—A mixture whose B.t.u. value is between 700 and 550.

Changes may be made within each group without any serious handicap to the appliance, no readjustment being necessary. If changes are made from any one group to another group, then it becomes necessary to make immediate changes and readjustments to the appliance.

If an appliance is installed and adjusted on a 1100 B.t.u. Gas, and it becomes necessary for the gas company to mix this gas with a coke oven by-product gas, then the natural gas may be mixed with this coke oven gas within the first group limit without any danger to the appliance. However, in 1928 a certain gas company changed the rate schedule of a suburb by giving it a 750 B.t.u. gas where it had previously used a 1100 B.t.u. natural gas. Before this gas could be used, it was necessary for the service men of the gas company to readjust every gas burning appliance to this new mixture. It is evident that the effects of mixing two or more gases depend upon the component gases and their proportions in the mix.

Importance of Primary Air

Each group was found to give definite characteristics in respect to flame velocity, travel and necessary primary air. The efficiencies naturally depended upon the distance of the burner to the nearest heating surface. Orifices changed with each group. Because of its effect on the rate of reaction, and therefore on the size of the flame, primary air becomes of great importance in determining the operating characteristics of most gas appliances. With these few known facts it is possible for the manufacturer to standardize on parts and fittings and effectively apply the appliance. This knowledge will guarantee satisfactory service and help the gas company to eliminate complaints.

The characteristics of the first group were those of regular natural gas with corresponding changes to a flame with better defined inner and outer cones and a quicker burning velocity as the B.t.u. approached 900. Burner ports with a drill between a 36 and a 34 seemed to give the best results. Normal manifold pressures were found to be between 6 and 8 inches of water column. No appreciable change was found in efficiencies in this group. Air injection remained constant and did not call for any change, while the main orifice needed a little adjustment to keep the same flame heights. An adjustable needle valve is desirable for this slight change, thus making it unnecessary to change the main burner spud. A spud drilled to a 38 for a rating of 25,000 B.t.u. was close to the average on water heaters, radiant fires and range ovens.

There is a marked change between the first and second groups. Here, the quantities of Hydrogen and Carbon Monoxide present have a tendency to change the characteristics of the flames. This group is generally a mixture of natural gas with either coke oven or water gas. If water gas is used, there will be larger quantities of Hydrogen and Carbon Monoxide present. This mixture is one which is apt to play tricks on the appliance and cause unlooked for trouble. Even though natural gas is present, the flames of this group behave like a pure manufactured gas and are apt to be misleading. The gas appliance manufacturer is betwixt the devil and the deep blue sea, whether to use equipment for natural gas or for manufactured gas, or to use entirely special equipment for this mixture. In the majority of cases, manufactured gas equipment was used, with changes for all orifices. The burner distances were kept the same, due to the fact that the outer cones of the flames were too long to guarantee satisfactory operation with raised burners. A manufactured gas burner port was used, preferably between a 40 and 44 drill. This tends to give the flames a somewhat larger cone, and with the decrease of primary air has the same effect as of raising the burner. The cutting down on the primary air will also tend to keep the burner from flashing back. In some instances, wire gauze was used in the mixer shields to prevent flashback. Efficiencies decreased slightly from 2 to 3 per cent under that of group one. Manifold pressures averaged between 4 and 6 inches of water column. For a rating of 25,000 B.t.u. where the main office for group one was a 38, now changes to a 32 drill.

Tendency to Flashback

Group three is generally a mixture of manufactured gases with the addition of illuminants to get the higher B.t.u. values of this group. Straight manufactured gas equipment can be used for this mixture without any harm. There is however, one thing that should be guarded against in this group, the tendency of this high burning velocity gas to flash back into the mixer tubes. This is particularly true where a great deal of producer or blue gas is used. Wire gauze mixer shields tend to decrease this hazard. There is one harm in using mixer shields because of their tendency to catch and collect dirt and lint which will in time close the primary air openings entirely. When used, these shields should be frequently renewed and cleaned. Gauzes are unnecessary if the air shutter makes a good fit with the head of the mixer tube. Where the gauze is used inside of the burner, just below the burner ports, this condition is not so pronounced. A burner port between a 40 and 44 drill seemed to be of average use and gave the best results. Efficiencies did not change from group two, while the amount of primary air was slightly reduced. A corresponding main burner orifice now changed to a number 27 drill. Adjustable needle valves are recommended in all cases. The normal manifold pressure

changes from 3 to 5 inches of water column. Due to the well defined inner and outer cones of the flames of this group the flame lengths are shorter. It is possible to raise the burner slightly to get an increased efficiency. However, it was generally found that the majority of manufacturers were willing to sacrifice this possibility in order to be able to guarantee a greater safety of operation.

Naturally the ideal condition would be to have special equipment for each respective group. This, of course, ties up capital and slows up production. As profit is now mainly based on the amount of routine production, any change or delay eats into the pocket-book. To have one's appliance meet the special requirements of this mixed gas means either a large stock to be carried on hand or no stock at all. There are many handicaps, as the appliance man well knows, in making the appliance satisfactorily meet the variable conditions of these new mixtures. The equipment necessary to make one appliance work satisfactorily, cannot always be applied to another appliance of the same type. Consequently, what may apply to one manufacturer cannot be practically applied to another.

The gas companies are farther advanced in the information concerning the initial factors necessary for these change overs from one gas to another. Sheer force of necessity enabled them to arrive at a solution, they being compelled to eliminate the obstacles brought out in the appliances, due to the change over. Changing the consumers supply from manufactured gas to natural gas is not new and has been practiced for the past ten years or more. Changing from natural gas or manufactured gas to mixed gas is new however, and requires as much study and consideration as previous changes. It is extremely important to the gas industry and is pertinent to everyone engaged in the gas business today.

Denver Experience

Superintendent George Wehrle tells us that when the Public Service Company of Denver changed over from manufactured gas to natural gas it was necessary to train a crew of 350 men to carry on the work of adjusting appliances. These men were schooled very carefully before being entrusted with such important work. The city was divided into nine districts and the mains so sectionalized that natural gas could be turned into one section at a time while the balance of the city was still using manufactured gas. The time required to complete a district varied from three to six days, and forty actual working days were required to complete the change over.

Statistics for 1929 show that out of 98 companies there is a gain of 49.7 per cent in manufactured gas companies buying natural gas.

The A.G.A. Laboratory at Cleveland, Ohio is at present conducting a research on mixed gas problems, which when completed should be of particular interest to gas companies and gas appliance manufacturers.

The apparent problem to the gas companies who are distributing mixed gas is to find ways and means to build up their load as quickly as possible in order to obtain early profits for previous expenditures. The manufacturer offering the appliance having the minimum amount of service on this new gas, is going to reap the profits of increased sales, and it is only through the medium of good service that the demand for city gas can be properly maintained and developed. After all, the final decision on satisfactory service can come only from the consumer, and is found as a result of his observations of gas burning appliances. Only through the cooperation of the appliance manufacturer with the gas companies can the ultimate goal of satisfactory service be attained.

As soon as the appliance manufacturer realizes and reconciles himself to the fact that money must be spent in ascertaining these necessary factors of perfect operation, the sooner will profits appear from increased sales. As it is not practical to give a set of universal rules that will apply to all appliances, it is my suggestion that all appliance manufacturers do as our company has done, that is, make up a small research program to find out just how your appliance is going to operate on the three mentioned groups of mixed gas.

Public Contact Training

"MANAGEMENT is growing to recognize that 'being human' with customers is good business, and that no matter how good the product sold, if the customer is dissatisfied with the personal service received, much of the good will created by the quality of the product is offset by the quality of the personal service," Mr. Byron F. Field, Superintendent, Training Division, Commonwealth Edison Company, said before the Public Relations Conference of the American Management Association at Niagara Falls on February 4.

"Led by various public utilities and certain progressive industries, business concerns are making a determined effort to train their employees in a better understanding of customers and how they should be treated," Mr. Field continued. "Public contact training is sometimes called 'training employees for the improvement of their service to, and business relations with, customers.' It is also often referred to as 'personal service improvement.' Public contact training differs from other phases of training in that it depends very largely on the mental attitude of those being trained toward the customers, the company, and the job. The best employee relations with customers require a genuine interest in those customers' needs and wants, and a desire to satisfy them.

"In the past," Mr. Field went on to say, "emphasis has been placed on physical equipment, mechanical and personal efficiency, and the improved quality of the product. Frequently, where attention has been paid to personal service to customers, it has taken the form of lectures, pamphlets, and courtesy mottos.

"Since a quickened employee consciousness of customer wants and problems is desired, employees, under the newer plan, meet together in groups where possible to discuss those customer needs by attempting to place themselves in the customer's position. Where management has formerly hung the motto 'Think' on the wall, it is now carrying through by compelling thought which in turn is reflected in improved personal service.

"In the plan which is being used increasingly, the employees themselves, with the encouragement and aid of their superiors, are preparing guides of personal service which will indicate to them how best to carry on their dealings with customers. In determining what particular things go farthest in satisfying the wishes of customers, employees are generally finding that genuine interest in the customer, the furnishing of complete and accurate information, the using of understandable speech, and the making of the usual courtesies are indispensable. Personal appearance as well is found to have a definite influence on the customer's reaction.

"Banks, railways, hotels, and sales divisions of all kinds of manufacturing organizations which have been somewhat complacent in feeling that their personal service was excellent," Mr. Field said, "have generally been surprised to find when a survey was made from the customer's point of view that there was much left to be done."

Annual Meeting of New England Gas Association

EDITORIAL STAFF REPORT

M. B. Webber, President Elect, New England Gas Association

THE New England Gas Association held their annual meeting February 4th and 5th at the Statler Hotel, Boston, Mass. One of the most interesting reports on the activities of the Association was centered about the cooperative advertising plans of the New England Gas Association. During the past three years in which this cooperative advertising plan has been in operation, upwards of one-half million dollars has been spent by the gas utilities of New England and the splendid results from this campaign were brought out by J. David Houser of the Houser Associates in a report on "Consumer Gas Acceptance." This organization sent representatives throughout the New England States with a series of questions to housewives. They made it plain that they did not represent gas companies in any way and that their replies to the questions were not to be published. The results so far as the survey had progressed showed that a large percentage of the gas customers in New England were satisfied with the service rendered by the utilities in their respective localities, but also pointed out that there was a big job yet to be done with the housewives who felt that the use of gas was expensive. All of the figures were worked out in the form of charts giving exact numbers per thousand people interviewed and these we believe will be published at a later date.

New England Uses More Gas

The gas utilities of New England made a splendid record in 1930 as compared with 1929, having made an increase in gas consumption for domestic purposes of 3.8% over 1929. Gas househeating increased in 1930 over 1929 by 26%. In spite of a considerable loss in consumption in gas used for industrial purposes, there was a net increase for 1930 over 1929 of 3%. Alexander Forward, Managing Director of the American Gas Association called attention to this fact in his talk to the meeting and stated that so far as figures for 1930 were available the New England gas companies were the only group that had made a net increase in 1930 over 1929.

H. Vittinghoff, retiring President of the New England Gas Association outlined briefly the various activities of the Association and urged that all the activities undertaken should be continued with increased vigor.

William Gould presented the N.E.G.A. Sales Contest Awards. The Awards of Merit were as follows:

Class A

Greatest sales of Ranges per domestic customer, won by: Portland Gas Company, represented by E. A. Willard.

Greatest sales of Automatic Water Heaters, won by: New Haven Gas Light Co., represented by Frank J. Shields.

Greatest sales of Refrigerators, won by Portland Gas Light Co., represented by E. A. Willard.

Greatest increase in Domestic Output, won by, Arlington Gas Light Co., represented by E. J. Walker.

Class B

Greatest sales of Ranges, won by: North Shore Gas Company, Ipswich, represented by F. E. Stevens.

Greatest sales Automatic Water Heaters, won by: Bangor Gas Light Co., represented by Robert Ingle.

Greatest sales of Refrigerators, won by: Portsmouth Gas Company, represented by W. R. Harvey.

Greatest increase in Domestic Output, won by: Citizens' Gas Electric & Power Co., represented by W. L. Mather.

The Permanent Cup Awards went to the following companies:

Range: 1. Ipswich, Mass. 2. Milford, Conn.
Tank Heater: 1. Greenwich, Conn. 2. Calais.
Automatic Water Heater: Gardner, Mass.
Room Heater: 1. Nantucket, R. I. 2. Rochester, N. H.
Domestic Output: 1. St. Johnsbury, Vt.

Two classes of awards:
1—First prize cups given by Sales Division.
2—Second prize cups given by Manufacturer's Div.
First prize cups in competition five years.
Second prize cups in competition three years.
Domestic Output cup in competition two years.

Cups awarded above under the following rules:
1—Those having greater number of wins earned the award.
2—No company to get more than one award.
3—In event of ties, company having highest percentage received award based on figures in the year they won.

4—In case of company being denied two awards because of previous ruling, award goes to runner-up.

Clifford E. Paige, president of the American Gas Association delivered a very interesting address on "Utility Relations," in which he pointed out that plans for cooperation with the dealers and with the consumers did not mean very much unless they were backed up 100% by the gas companies.

Henry I. Harriman, president of the Boston Chamber of Commerce made an address on "The Relation of Modern Business Trends to Socialism." Another interesting talk was by Paul T. Cherington, Director Bureau of Research, J. Walter Thompson Company on "The Consumer Survey in Gas Sales Management, an Interpretation," in which he stated that the only way to find the consumer's attitude toward a product offered for sale is to find out what the consumer really thinks measured besides what she does and that the future of the gas companies lay in the hands of the consumer.

Women's Activities

Mrs. Gladys Beckett Jones gave a talk on "The Utilities' Part in Women's Activities." Mrs. Jones is Director of the Institute of Home Making, Boston University School of Education. She stated that "There are two methods of reaching the homemaker and as she buys approximately 90% of the nation's goods, she is the one to be considered.

"First, the direct sales approach. In this the salesman depends upon his selling ability to dispose of his goods but the homemaker has grown a bit wary of the high pressure salesman. She hates to be talked into buying something she does not know how to use and that will not give her satisfaction after she has bought it due to her lack of knowledge of its operation. There are too many pieces of unused equipment resting in suburban basements for any of us to advocate the use of this method.

"The second method is by educational contact with the consumer, and from my point of view as a consumer and teacher it is the only method of effectively reaching the purchasing public. It will take a longer time than the direct sales approach and returns are not as immediate but a satisfied customer is the ultimate reward. Naturally such educational work must reach large groups of women. It would be too time consuming and expensive to do much individual work.

"Do you realize how large a part equipment plays in the education of the student studying home economics? When she bakes a cake in a certain make of stove, she becomes aware of the imperfections in the stove or her interest is aroused by its satisfactory performance. She questions her teacher in detail as to the reasons why one stove bakes better than another, why the oven door is rattly and loose on one stove and tight on the other. Certain concepts are being established toward kinds of equipment and all of us must remember that the girl in the laboratory of today is a homemaker of tomorrow.

"The day of demonstrating the heavily frosted cake or pie has gone. Students are interested in the efficiency of the equipment and construction of equipment and relative cost and method of use.

"In planning the promotion of educational work it is well to remember that satisfaction received are of the utmost importance to the consumer. Any program put on by the Utilities that helps the women to operate equipment in a more satisfactory manner and to do their work in a more efficient and less time consuming way and gives them more of the satisfactions of life, will help us to reach that goal toward which we are striving; the satisfied consumer."

Garner Talks on Liquefied Gases

Another interesting paper was delivered by Dr. J. B. Garner, Propane-Butane Division, Standard Oil Company of New York, on "Liquefied Gases our Mutual Problem". After briefly sketching the progress made during the past 13 years in research and development work he stated,

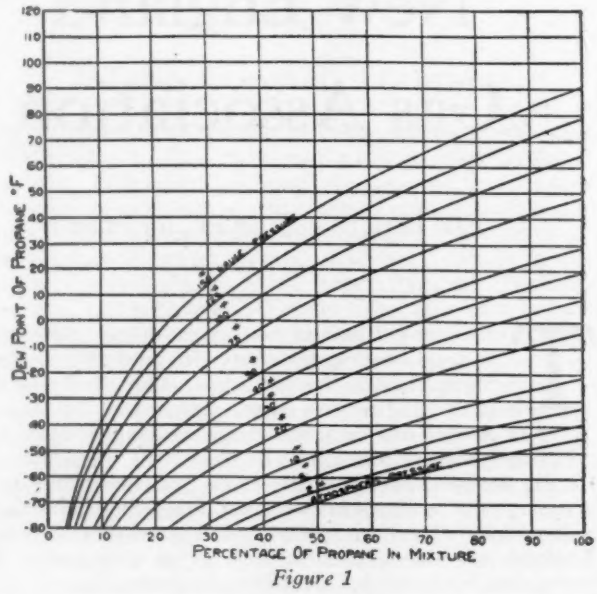


Figure 1

"There are two sources of commercial quantities of butane, iso-butane and propane:

(1) natural gas as it is delivered from natural gas and oil wells and

(2) refinery gases as they are produced in cracking operations.

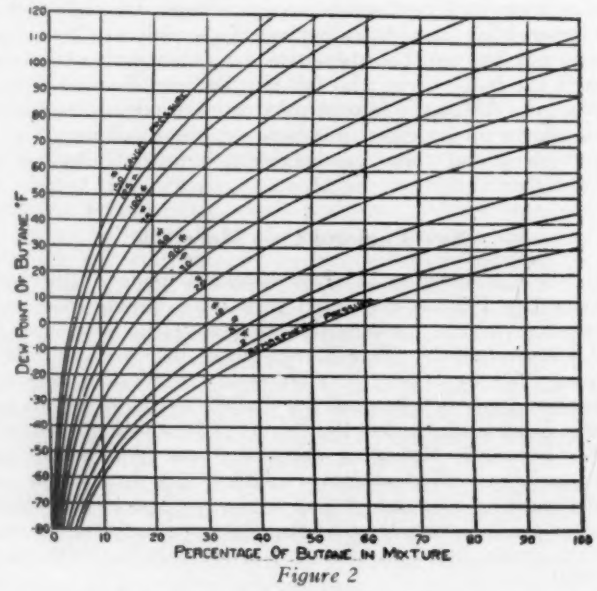


Figure 2

The quantities of these hydrocarbons, which will be recoverable from the two sources of supply wiil depend upon:

(1) the volume of gas available for treatment;

(2) the content of these hydrocarbons in the gas as treated and

(3) the sale value when recovered.

"Suffice it to say, that the volumes of the gases available for treatment and the content of hydrocarbons in these gases are equal to, and adequate for, all possible market requirements. The processing of these gases for the insolation of the liquefied hydrocarbons will be contingent upon whether it is worth while or not. We have no misgivings regarding the availability of the supply. Our concern is: will it pay the natural gas and petroleum industry to isolate and market these hydrocarbons as commodities? The supply is available on a sound, economic basis. The demand must be certain and regular if production costs are to be held at a low figure. The gas industry must likewise find it, not only profitable, but also progressive, to utilize these hydrocarbons for domestic and the manifold and varied industrial purposes."

"A brief compilation of the industrially important physical properties of two commercially known liquefied petroleum gases—'S-O-Tane' and 'Hopane' has been made.

Industrially Important Physical Properties

Figure No. 1

	S-O-TANE "Butanes"	HOPANE "Propane"
1. Normal state @ 60 F. and 30" mercury	Gas	Gas
2. Specific gravity of gas (Air = 1)	2.07	1.52
3. Specific heat of gas at constant pressure B.T.U. per pound	0.459	0.473
4. Limits of inflammability, % of gas		
lower limit	1.9	2.4
upper limit	8.5	9.5
5. Gross heating value per cubic foot @ 60 F. and 30" mercury	3,255	2,503
6. Cubic feet of gas per pound of liquid	6.54	8.59
7. Specific gravity of liquid 60/60 F.	0.574	0.51
8. Pounds per gallon at 60 F.	4.78	4.25
9. Cubic feet per gallon	31.27	36.51
10. Mean coefficient of expansion		
0 to 50 F.	0.001045	0.00143
50 to 100 F.	0.001205	0.00180
11. Heat of vaporization—		
B.T.U. per pound	162.2	183.1
B.T.U. per gallon of liquid at 60 F.	775.7	778.2
12. B.T.U. per pound of liquid	21,300	21,500
13. B.T.U. per gallon of liquid	101,800	91,370
14. Vapor pressure of liquid— Pounds per sq. in. (Gauge)		
@ 10 F.	1	32
@ 32 F.	8	58
@ 60 F.	24	98
@ 80 F.	38	134
@ 105 F.	62	192
@ 130 F.	93	269
15. Cubic feet of air required for complete combustion 1 cubic foot of gas	31.1	23.91

"It is imperative that the producer and consumer of liquefied petroleum gases shall have a knowledge of these physical properties so as to enable them to solve the problems which may arise:

(a) in the production of the hydrocarbons
(b) the provision of safe storage
(c) shipping containers and appliances
(d) loading and unloading of shipping containers
(e) transportation
(f) satisfactory pumps and compressors and
(g) efficient methods of transfer and distribution around local plants to points of utilization.

"Many executives of public utilities have expressed curious fear that the use of these hydrocarbons in air or other inert gas dilution plants may result in troublesome condensation or drip problems. The following curves, showing relationships of dew points—pressure—temperature—concentration of propane, normal butane and iso-butane, will be informative and helpful as well as alleviating these fars. By dew point is meant the temperature at which one of the constituents of a gaseous mixture will begin to condense.

Figure No. 4 Propane
Figure No. 5 Butane
Figure No. 6 Iso-butane

"Some executives and a few engineers have been concerned with the hazards which will attend the use of these liquefied hydrocarbon gases as raw materials in supplying gaseous fuel to the residents of villages, towns and cities. In case of leakage, the gases Per se, are

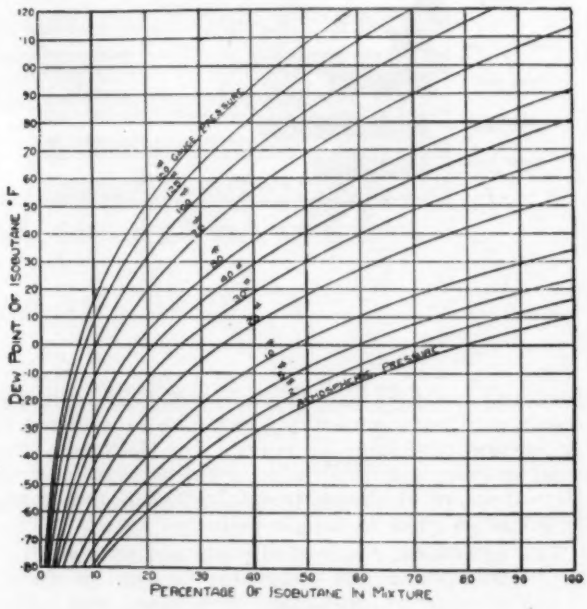


Figure 3

physiologically non poisonous; they have a distinct and characteristic odor, readily and easily detected. The gases do not stratify near the floor or in basements. They diffuse as all other gases do in any confined space. The explosive ranges of these gases are less extensive than those of any other commercial gases, and higher kindling temperatures are required to ignite mixtures of the gases and air. The gases do not have any corrosive constituents and are therefore without any action upon materials employed in production, transportation, or utilization. The use of these gases therefore:

(1) does not necessitate the introduction of a foul odorant;
(2) unusual means of ventilation are unnecessary; and
(3) hazards to life and property are minimized.

"The following Figure, No. 7 graphically represents not only the inflammability limits of commercial gases, but also the extent of the hazards of their usage:

"The program of facilities for production and distribution as it has been developed is in anticipation of a program of demands for economic consumption and utilization. There are certain well known factors which have

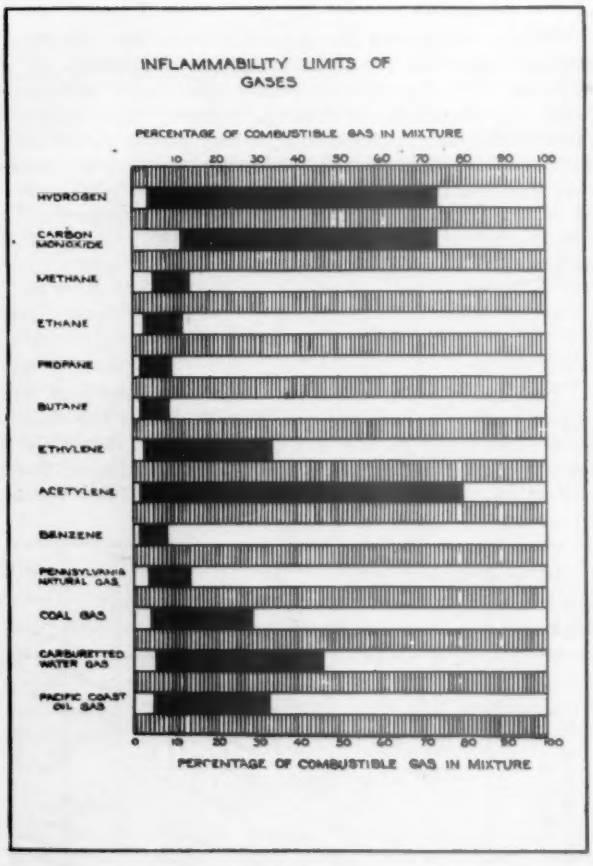


Figure 4

been and are now used in determining the utility and economy of any commodity which may be used for fuel or energy producing purposes. The following items must be given a definite value in any accurate and complete appraisal or summarized valuation of the liquefied hydrocarbon gases to the gas industry.

(a) investment required in plant and accessories
(b) cost per unit of commodity to point delivered
(c) expense of operation, purification and maintenance;
(d) quality of commodity and finished fuel as distributed
(e) flexibility of use of commodity in meeting any unusual or peak load requirements of volume, heating value
(f) adaptability of commodity for specific use."

Additional papers presented at the last session was one by P. T. Dashiell, Engineer of Works, Philadelphia Gas Works Company, on "The Use of Heavy Oils for Carburetting"; another by F. S. H. Lesieur, Manager, Arthur J. Young Company on "Accounting Trends in the Industry" and the last paper of the session by Dr. Alfred P. Haake, Managing Director National Association Furniture Manufacturers on "Is There a Moses Among You?"

Webber Elected President

The officers for the coming year are as follows: President, M. B. Webber, Boston, Mass., First Vice-President, I. T. Haddock, Cambridge, Mass.; Second Vice-President, D. M. DeBard, Boston, Mass.; Treasurer, F. D. Cadwallader, Boston, Mass.; Executive Secretary, C. D. Williams, Boston, Mass.

Business in 1931

THE year 1930 has been a very severe test for American business. The public utilities have stood this test better than any industry that I know of. The sales of gas and electricity for domestic, commercial and industrial purposes are practically the same as for 1929.

Owing to the great diversity of industries in the territory served by The United Gas Improvement Company and the more stable social and economic conditions, the gas and electric sales of the properties in the U. G. I. System are actually ahead of 1929.

I am so encouraged by the way in which our U. G. I. properties have stood the test of the greatest depression in many years, that we have arranged our construction budgets for 1931 without any reference to existing business conditions. We are planning to spend in the way of betterments, extensions and improvements in 1931 something over $31,000,000.

So satisfied am I that prices have about reached the bottom that we have carefully gone over our budgets for 1931 with the object of advancing such projects as might be undertaken at once and so take advantage of the low price of materials.

From the standpoint of the industry as a whole, I am convinced that the interests of the public and the utilities are always best served by effective state regulation, and any well-considered measures calculated to strengthen the confidence of the public in the regulation of public utilities should receive the cooperation and support of the entire industry.

Rates should be constantly adjusted so as to yield only a fair and reasonable return on the value of the property devoted to the public use. This return should be sufficient at all times to attract new capital and to include a reward for efficient, enlightened and honest management. Economies resulting from efficient management and from mergers, consolidations and interconnections should be shared with the consumer in reduction of rates.

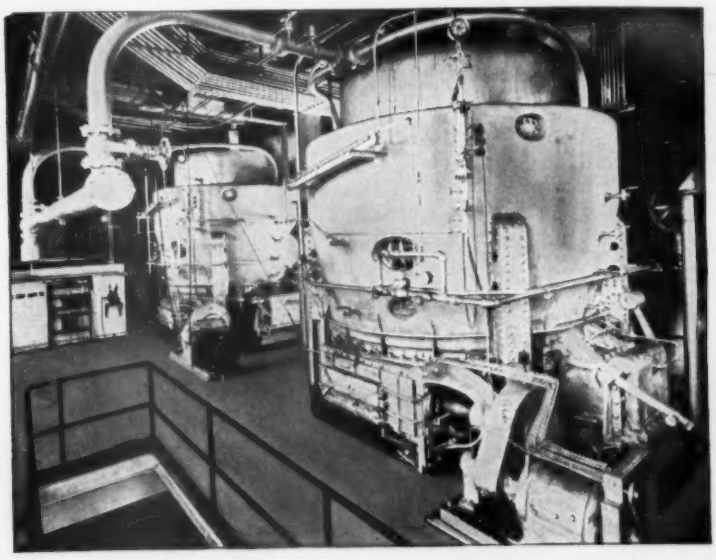
Publicity in the financial affairs of a public utility inspires confidence on the part of the stockholder and the public. Public utilities therefore should issue at frequent intervals full statements of their earnings in sufficient detail to give their stockholders a thorough understanding of the affairs of their companies.

Holding companies are essential to the expansion and development of public utilities and must not be used to exploit either the consumers or the operating company. Full and complete disclosures should be made of all agreements between the holding company and its subsidiaries covering services rendered by the holding company for financing, managing, purchasing and construction, to insure that they are fair to the consumer, the operating company and the holding company.

Government should confine itself to regulation of public utilities and not go into the public utility business. Government should not compete with any of its citizens in any field of business.

I look for a gradual and steady improvement in business in 1931, and am confident that the public utilities, having given such a good account of themselves in 1930, will be among the first to feel the effect of such improvement in general conditions in increased sales of gas and electricity for industrial purposes.—*John E. Zimmermann, President, The United Gas Improvement Company.*

U. G. I. MECHANICAL GENERATOR



Fourth installation

now under construction at Chester, Pa.

for the Philadelphia Electric Company

In 1929 the first two Mechanical Generators were installed. In 1930 the third was placed in operation and the fourth contracted for.

Advantages of the U. G. I. Mechanical Generator:

Continuous operation for extended periods
Low fuel consumption
Low labor costs
Low carbon loss in ash
Low maintenance
Heat otherwise lost recovered as steam
Bituminous coal may be used as fuel

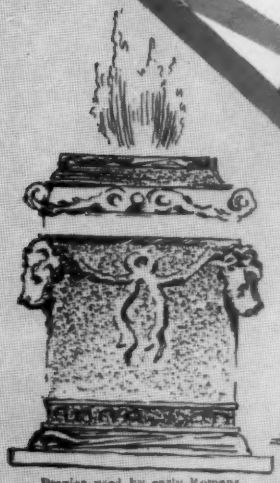
THE U. G. I. CONTRACTING COMPANY
DIVISION OF
UNITED ENGINEERS & CONSTRUCTORS
INCORPORATED
DWIGHT P. ROBINSON, PRESIDENT

Philadelphia
112 North Broad Street

Chicago
Conway Building

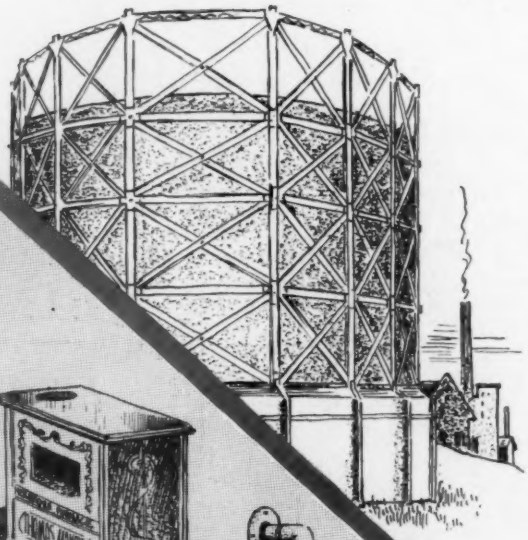
MAXIMUM RETURN TO CLIENTS PER DOLLAR INVESTED

The DAWN OF A

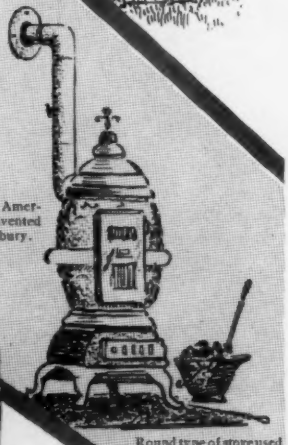


Brazier used by early Romans and Greeks. Earliest method of home heating.

Early Colonial fireplace. Your face cooked and your back froze.



In 1767 the first American stove was invented by Thomas Maybury.



Round type of stove used for burning coal and wood. Messy and inefficient.

This is the symbol of the modern era of home heating. Use it all the time. Gladly will we furnish electrotypes of this symbol for the use of the gas company, in any needed size.

burn GAS There's no FUEL like it!

NEW ERA IN HOME HEATING

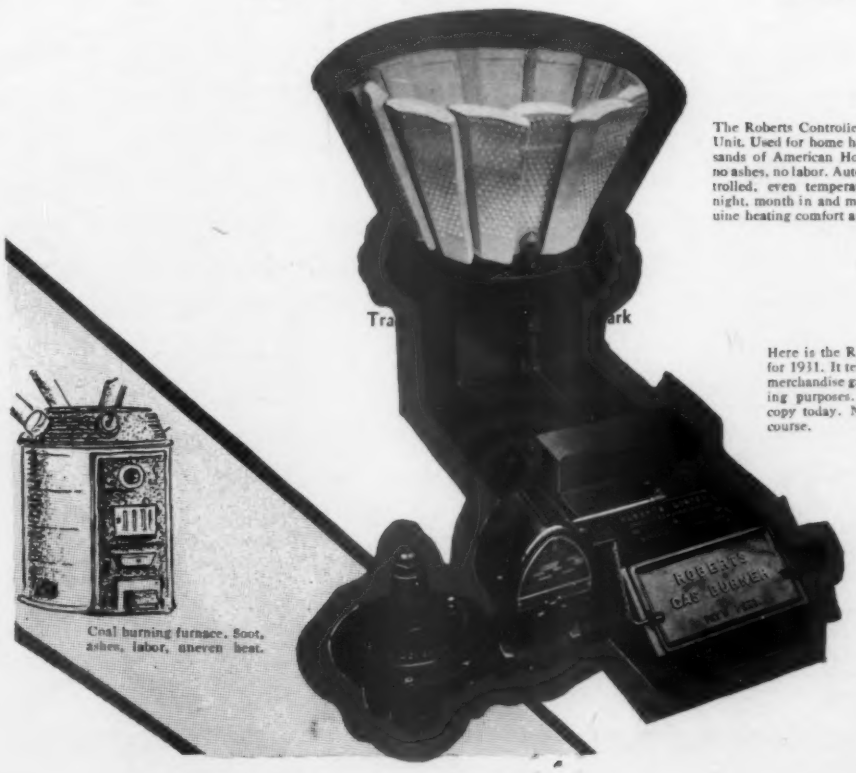
And with this New Era comes Greater Gas Revenue

IT'S a far cry from the ancient days of house heating by means of the early Roman Brazier, to the ultra modern method of home heating by gas the Roberts way. But this modern method didn't come over night. It is the result of a process of evolution extending back over a period of thousands of years.

A new era of labor saving, and health advancement is dawning in the American home. All over the nation, today thousands of homes are experiencing the ease and luxury of gas home heating the Roberts way. And with this new era greater opportunities than ever are opening to the gas company for increased gas revenue.

Is your company keeping step with this march of progress? Are you making the most of the Gas Age opportunity? Are you energetically advancing the cause of home heating by gas in your community? Let Roberts help you. Send for the new Roberts Book for 1931. In it are shown complete plans for taking advantage of the big opportunities gas heating offers. No obligation, of course.

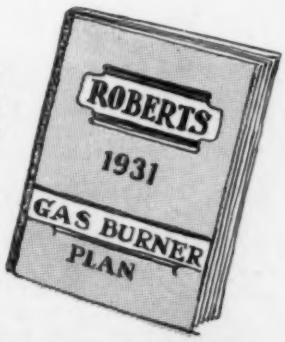
ROBERTS-GORDON APPLIANCE CORPORATION
DELAWARE AVENUE AT TUPPER STREET
CURTISS BUILDING BUFFALO, N. Y.



The Roberts Controlled Gas Heating Unit. Used for home heating in thousands of American Homes. No soot, no ashes, no labor. Automatically controlled, even temperatures day and night, month in and month out. Genuine heating comfort and luxury.

Coal burning furnace. Soot, ashes, labor, uneven heat.

Here is the Roberts plan book for 1931. It tells how you can merchandise gas for home heating purposes. Send for your copy today. No obligation, of course.



ROBERTS CONTROLLED GAS HEATING UNIT

It Is a GOOD Gas Range That Has This RED WHEEL

Another NEW MAGIC CHEF

MODEL AT AN ATTRACTIVE LOW PRICE . . . .

TO REACH a vastly wider market American Stove Company announces another new Magic Chef . . . the Doric Model . . . to retail at the low price of $74.75.

• This charming new Magic Chef, Grecian in design, is porcelain enameled in Old Ivory finish with green crackled enamel trim. Handles are of ebonized bakelite mounted on escutcheons of the same trim. Linings are also porcelain enameled. Insulation is optional at extra charge.

• Like all Magic Chef models, the Doric has the well known Red Wheel Oven Heat Regulator found only on American Stove Company products.

• The Doric is only slightly smaller than the Tiffin Model and will fit into more limited space, yet has ample cooking capacity for ten people.

• With its outstanding quality, beauty and remarkable price appeal, this new Magic Chef will meet with enthusiastic sales response.

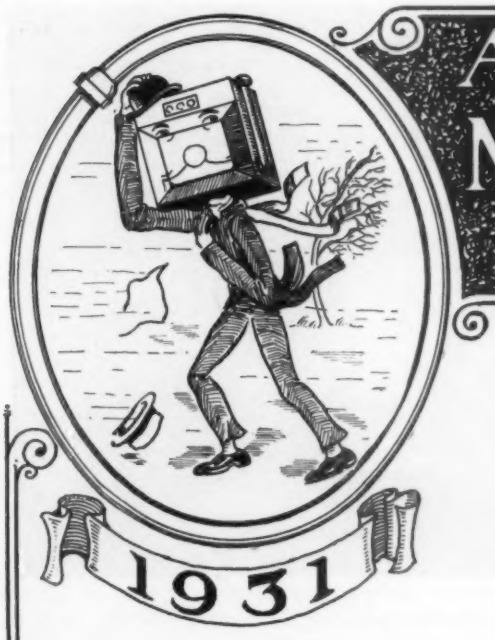
• For full details write American Stove Co., Dept. C, 801 Chouteau Avenue, St. Louis, Mo.

Magic Chef

AMERICAN STOVE COMPANY

World's Largest Manufacturer of Gas Ranges

NEW YORK CHICAGO PHILADELPHIA ST. LOUIS ATLANTA SAN FRANCISCO CLEVELAND LOS ANGELES



AMERICAN GAS MERCHANDISING ALMANACK

March

Flower, Violet. Color suggests darkness, ashes, sorrow. Use it with discrimination if at all. Better something more suggestive of Spring.

THE month of March ushers in the joyful Spring season; the time when one shakes the dust from his fishing tackle and assiduously studies the railroad time-table for information of the most direct route to the trout stream. It is the time for taking a fresher, more hopeful outlook on things in general. Aside from Spring being the season when the home manager dusts the remaining moth balls from hubby's Summer suit, it is the time when there is an accumulation of rubbish and litter to be disposed of. Accordingly, it is an ideal time to stage an intensive drive on gas incinerators. In sooth, an incinerator in operation in the cellar is worth two abominably unsightly rubbish boxes in front of the house, waiting for the belated trash collector. Incidentally, one of such boxes will spoil the effect of one dozen first class evergreens on the lawn.

March also brings to the alert gas man the knowledge that he should start to hammer home the fact that the gas refrigerator is the ideal food preserver, conserver, and ice maker for the home; a noiseless necessity that is deserving of better treatment at the hands of a number of gas companies who ought to know better.

Home heating by gas should also come in for a bit of advertising at this season, for there is no time like Spring to impress on the man and his wife the desirability of this clean, convenient, automatic method of solving the heating problem. We have heard of more than one case where a customer installed gas househeating in March rather than waiting for the following September. At least the seed can be sown during Spring for Fall harvesting.

1—Sun. **Where Sunday newspaper is available announce opening of gas refrigerator sale and Special Sale of Gas Incinerators.** Nebraska admitted to the Union, 1867.

2—Mon. **Conduct store demonstration. Check up floor and window displays.** Sam Houston Memorial Day, Texas.

3—Tues. **Make sure that floor sales people are calling the attention of all store visitors to gas refrigerators and incinerators.** Alexander Graham Bell born, 1847. **Run second newspaper advertisement.**

4—Wed. New Government of the United States went into effect 1789. **Look over merchandise; see that all price tags are clean.**

5—Thurs. **Conduct store demonstration; show folks how waste may be disposed of in a gas incinerator and how frozen desserts may be made in the gas refrigerator.**

6—Fri. **Run third newspaper advertisement. Go over prospect lists with salesmen.**

7—Sat. Ben A. Williams, author born, 1889. The Cabinet Type Gas Range was unknown.

8—Sun. O. W. Holmes, judge, born, 1841.

9—Mon. **Change Window display, rearrange merchandise on sales floor.** Battle between Merrimac and Monitor, 1862.

10—Tues. **Run fourth newspaper advertisement. Conduct store demonstration.**

11—Wed. **Phone some of the live prospects; try to arrange for interview by salesmen.**

12—Thurs. United States Post Office established, 1789. **Mail special mailing piece to live prospects.**

13—Fri. **Run fifth newspaper advertisement.** Standard time adopted, 1884. Time and temperature cooking unknown at that time.

14—Sat. Cotton gin patented, 1765.

15—Sun. Andrew Jackson born, 1767. He never heard of a carefree gas water heater.

16—Mon. West Point Military Academy founded, 1802.

17—Tues. St. Patrick's Day. **Opportunity for special window display. Run sixth newspaper advertisement.**

18—Wed. **Special store demonstration.**

19—Thurs. James Bogardus, an American enginer, invented a dry gas meter which was patented by Miles Berry, 1833.

20—Fri. **Change window and store displays.** Patrick Henry delivered historic address, Richmond, Va., 1775. Since that day gas service has freed millions of women from pot-watching.

21—Sat. Spring begins. **Opportunity to advertise the advantages of a gas incinerator for use in the spring clean-up, and a new gas refrigerator to make the coming summer a happy one.**

22—Sun. Naturalization act passed, 1790.

23—Mon. **Conduct morning meeting with the view of closing all of live prospects on file.**

24—Tues. Andrew Mellon, statesman born, 1860 Manufacturers had not begun to appreciate the value of gas as a fuel.

25.—Wed. **Run newspaper advertisement. Conduct store demonstration.**

26—Thurs. South Carolina formed a provisional government, 1776.

27—Fri. **Run special newspaper advertisement.** Florida discovered, 1513.

28—Sat. **Store demonstration.**

29—Sun John Tyler born, 1790.

30—Mon. Ether first used, 1842. **Perfect plans for April Activities. See that newspaper and other advertising are in readiness; that window display material is at hand; that special store stocks are at hand.**

31—Tues. Robert Wilhelm von Bunsen born, Gottingen, Germany, 1811. **Bring out and arrange stocks for April Sale. Build April Window Display.**

A City Wide Clean-Up Campaign

WITH the coming of Spring, the home managers' houghts turn to home cleaning and the disposal of odds and ends which have accumulated during the long dark months of winter.

March ushers in the coming of the Spring season and is an ideal time to open your incinerator campaign. Incinerators have been sold in considerable numbers by gas companies and heating engineers. In many cities all modern homes and apartments include an incinerator in the building specifications, but, a check-up reveals the fact that they are not all gas incinerators. The reason for this is said, by some, to be due to the fact that no one has seemed very anxious to sell them gas incinerators. Others attribute it to the fact that the furnace men recommend a coal fired installation along with a coal fired furnace, and they let it go that way. However, there are cities where the gas man and the heating engineer do specify, recommend and sell gas incinerators. So you see——IT CAN BE DONE. With that knowledge, a plan that may be helpful in selling gas incinerators is offered: namely, a city-wide clean-up campaign to sell gas incinerators during the coming Spring, Summer and Fall months.

As we said in the foregoing paragraph, gas incinerators CAN be sold and they are sold, however, like any other specialty or staple, they may be sold in a greater volume if they are sold according to a definite plan rather than by the old-time storekeeper's method wherein merchandise was purchased and set up on display in the store with a prayer that, some day, some one would come along and purchase it.

Effective Incinerator Window Display

Sales Theme

To sell gas incinerators a plan should be laid out, having as its objective the sale of a certain definite number of gas incinerators in a definite period of time. First and foremost, this sales activity should have a sales theme. In offering these suggestions for building the plan, (which is modeled upon data secured from several very successful sales), we have taken as a theme or name for our campaign "A City Wide Clean-Up Campaign."

A theme of this sort, we believe, will attract attention from any who might happen to see it, either in the newspaper advertisements, window display advertisements or in direct-mail advertisements. Having selected a name for the campaign, the next move is to select the merchandise you expect to sell and decide upon the number of units that you honestly believe may be sold. This done, the matter of terms and price must be decided upon; the method to be used in exploiting the merchandise; the matter of making actual or personal contacts with prospective customers; the education of employees and dealers and the manner of securing civic co-operation. The name of this campaign has been chosen with these thoughts in mind.

The next move is to decide upon the number of gas incinerators that we expect to sell. This can be arrived at by listing all new homes and apartments in the course of construction; by listing all homes in certain classes (say $5,000.00 and up) which are not equipped with gas incinerators; all apartments, and certain industrial and commercial establishments. From this list, strike out those which you may consider doubtful for any reason and those that you are certain have modern gas incinerators. Then, after a careful checking, decide upon a certain percent of the remaining that may be considered A-1 prospects and let this number represent your quota for the year's drive. When the list has been thus revamped, decide upon the number of mailing pieces you intend to use throughout the year and schedule all mailings. Lay out a systematic plan of calls. List all builders and architects and assign a card to them. See that they are supplied with catalogues, giving prices, sizes and such other information that you may have showing the advantages of gas for incineration.

Thus, the general plan of the year 'round activity is set up. Your next job is to set up an opening campaign or a drive to give the appliance a general introduction. This may be done by working out a plan and a series of advertisements for use in the daily papers, planning so as to get a tie-in at the time the city conducts its annual Spring clean-up campaign, and in the Fall during fire prevention week. At such times, you may secure the aid and the endorsement of the local fire chief and the department. Such a tie-in through newspaper advertisement and store window displays—with civic activity always proves very profitable. Have all salesmen plug hard for business during this time. Let them sell gas incineration and nothing else for a whole week. Assign a definite quota to each man; a quota to be made during this week. Offer special bonuses during the week, or, hold a special contest and inject a little showmanship into the selling.

Plan of Payment

In opening a drive, it is well to decide upon a plan of payment that will not work a hardship on a new home builder. A small down-payment and extended monthly payments help mightily at such a time, for, in the majority of cases, the home builder will count the installation of a gas incinerator as just another extra. However, the very convenience of the appliance will cause

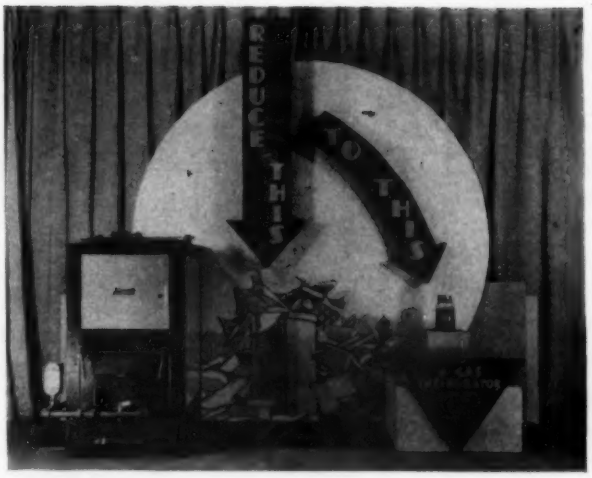
him to strain a point to pay for it, when it is installed and in use. For this reason, it is especially advisable for you to make it easy for him to buy by offering him installation of the appliance for a minimum down-payment.

As for employee education, all employees should be told something of the methods of operation of a gas incinerator; burning periods, efficiency in disposition of waste, as well as the general all 'round convenience of the appliance. Those who are expected to sell it should be given a thorough grounding in its construction, operation, operating cost, installation, capacity and sizes available. In other words, the more fully they are informed, the more likely they will be to inform others as to the advantages and the desirability of owning such an appliance.

Salesmen's Meetings

Salesmen's meetings should be held at which a manufacturers' representative should be invited to talk of the merits of the appliance and the best methods of using and selling it. Aside from this, the salesmen should be provided with full written information regarding the appliance. This information may be secured from the manufacturer. One manufacturer provides dealers' salesmen with a handbook. They should also be provided with descriptive catalogues, price lists, photographs of actual installations and letters from owners and users whenever possible. These things are very helpful in selling the class of home owners, builders, designers and operators, who are logical, immediate purchasers of gas incinerators. They help to "get there" with all home owners who may be using gas for home heating.

Herewith we are showing what has been done in the way of advertising incinerators through various media. The display featuring the reduction of a great heap of waste to a jar full of plant fertilizer under the caption "Reduce This to This" is a creation of Ray Martin, Display Manager of the Consolidated Gas Company of New York. The one taking for its theme "Safeguard Their Health" was originated by Robert M. Angel, Display Manager of the New York Power & Light Co., Albany, N. Y.



A Good Idea by Ray Martin

A company that we know of made a big success of selling gas incinerators by employing a series of five letters to prospective purchasers together with the use of red "Danger" tags and liberal consumption of newspaper space. A letter telling of the advantages of the gas incinerator was hung on all meters by the company's meter readers. This was done just prior to National Fire Prevention Week. The letters played-up and told of the advantages of incinerators along various lines; quick sanitary and safe disposal of garbage and waste, and invited the prospect to send for a free book.

Tying up window display with Fire Prevention Week

Buy Now Campaigns

TRADE recovery, not only here but throughout Europe, is definitely retarded by the fact that retail prices have not adequately reflected basic price declines. The function of price declines is to stimulate consumption. If the ultimate consumer does not get the benefit of the price recessions, increased consumption simply does not occur. Every day, therefore, in which certain retail prices still hold up means postponement of "the turn."

It is up to the retailers to move goods, not by sentimental appeals to "buy now," but by so pricing goods as to entice the imagination and cash of consumers. One great merchant, to test the situation, selected some 2,000 articles, put a bargain price on them and vigorously advertised. He not only exhausted his stock, but the demand for one of the articles was so great that he had to get in 15,000 more to meet it.

Whatever price will move goods is the proper price. Those who are holding on in an expectation that, when recovery comes, they can get old prices for their goods are in for a good licking. A new economic basis is being established and those merchants who adjust themselves to it first are the ones who will first reap rewards. "The retail trade must stand its share of the liquidation."

—Whaley-Eaton Service, Inc.

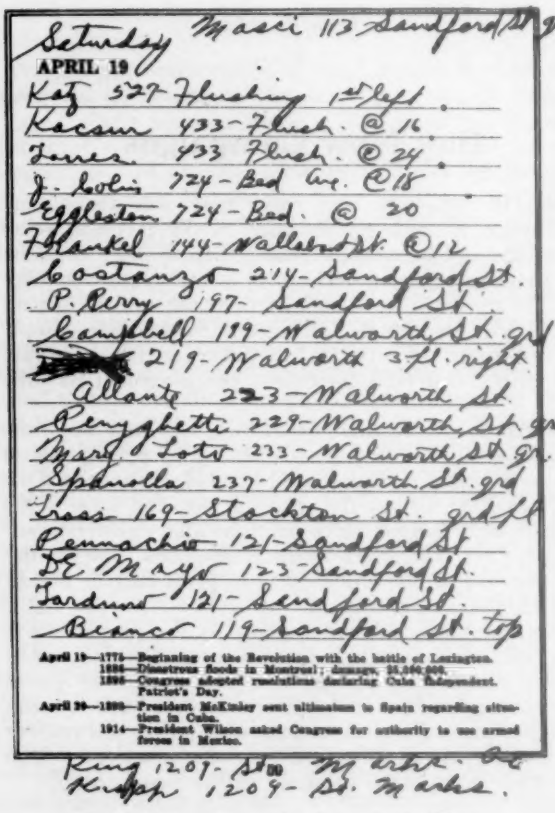
Here's How

Harry Schroeder, of Brooklyn Union Gas Company, outlines his plan for making record sales of Gas Ranges

ALTHOUGH it may sound trite the old sales manager's advice to "plan your work and work your plan" is the basis for the successful record I made during the year 1930 when I sold more gas ranges than any other retail district salesman employed by The Brooklyn Union Gas Company.

Every night I outline my work for the following day, planning what territory to cover and what hours I should devote to canvassing, following up and the other details that enter into the work of a house to house salesman. The next day I proceed to follow out as close as possible my plan.

My plan calls for canvassing during the morning since I find this to be the best time of day for such work. In the afternoon I follow up prospects from previous days of canvassing and also take care of prospects given me by the floor salespeople. The major part of my work —that is the part that shows results in dollars and cents —is done in the evening, the time I close most of my sales.


Saturday Masci 113 Sandford St. grd
APRIL 19
Kaj 527 Flushing 1st left.
Kacsur 433 Flush. @ 16.
Jones 433 Flush. @ 24.
J. Solis 724 Bed Cor. @ 18
Eggleston 724 Bed. @ 20
Blankel 144 Wallabout St. @ 12
Bootanzo 214 Sandford St.
P. Berry 197 Sandford St.
Campbell 199 Walworth St. grd.
219 Walworth 3 fl. right.
Allanta 223 Walworth St.
Perzybetta 229 Walworth St. grd.
Mary Lotz 233 Walworth St. gr.
Spinella 237 Walworth St. grd
Grass 169 Stockton St. grd fl
Pennachio 121 Sandford St
DE Mayo 123 Sandford St.
Fardino 121 Sandford St.
Bianco 119 Sandford St. top
April 19—1775—Beginning of the Revolution with the battle of Lexington.
1886—Disastrous floods in Montreal; damage, $5,000,000.
1898—Congress adopted resolutions declaring Cuba Independent. Patriot's Day.
April 20—1898—President McKinley sent ultimatum to Spain regarding situation in Cuba.
1914—President Wilson asked Congress for authority to use armed forces in Mexico.
King 1209 St Marks
Krupp 1209 St. Marks.

Typical page from Mr. Schroeder's Diary

In following out my plan I rarely let any callbacks or prospects interfere with my hours of canvassing. Unless it is unavoidable I do not make appointments for the morning hours. I may call on a prospect in the morning if he or she happens to be in the district I am canvassing that day.

Canvassing is the best bet for a salesman, ninety per cent of my sales resulting from this source of work. I continue canvassing through any afternoon during which I have no prospects to visit.

As my work is in the field I find it advisable to call at the district office the latter part of every afternoon to bring in my day's business and take up various matters with the district sales manager. If unable to call at the office, I get in touch with the sales manager by 'phone to let him know of the day's activities and receive whatever instructions he may want to give me about the following day's work. I supplement this by telephoning several times during the day so the sales manager may be practically in constant touch with me.

Salespeople Make Appointments

Knowing that I call on prospects in the evening floor salespeople will make appointments for me to call on persons who are not at home during the day and only have the evening to discuss gas ranges. More of my sales are closed on Saturday afternoon and evening than any other time during the week.

I do not find it very difficult to secure admission to the homes of people in the territory served by The Brooklyn Union Gas Company. Showing the woman who answers the door my credentials I tell her I have come to give her service in seeing that her appliances are in perfect working condition. Usually she leads me to the kitchen where I inspect the gas range, noticing its condition and lighting up the burners to see if they produce a blue flame.

The woman becomes interested, usually asking me what I am doing. I explain to her the proper light and heat she should get from her range. If it is old, I ask

her if her utensils get discolored at the bottom. When she says yes, she usually asks the reason for the condition. I explain this to her, pointing out that the range is old and cannot be regulated very well.

It is then I begin my sales talk, showing her a catalogue containing pictures of various type ranges and explaining the operations and advantages of each as I go along. I try to work up her interest in the ranges by having her ask questions. In my answers I bring out the advantages of buying these approved ranges, sponsored by a responsible organization like the gas company.

Through these questions and answers I lead her to some remark which might be regarded as committing her to a purchase. Then I ask her whether she would like to purchase the range on a cash or a time payment basis.

When I sell a range I always leave my card asking the woman to let me know if she ever wants to find out anything about the range. I follow this up by calling back at her home a month or so later to see how the appliance is operating. On this visit I ask her about her range, knowing that a satisfied customer recommends others. I then ask her how her friends or relatives like the new range because in many cases I have had satisfied purchasers of ranges recommend other prospects to me.

I usually manage to get into about fifteen homes each day. A large number of these I find are interested in getting a range, but are not yet ready to make a purchase. I keep a record of these names and addresses, following up these people with occasional visits. Sometimes I telephone them or maybe write them a letter. Through some means or other I keep in touch with these prospects every month, using as my motto the bit of advice that "a prospect is never dead until he dies."

In The Brooklyn Union Gas Company the district salesmen receive splendid cooperation from the floor salespeople. They supply us with leads on people who may have only accompanied to the sales floor someone interested in an appliance. The floor salesman or woman tries to obtain the name and address of the party and, if successful, turns it over to one of the district salesmen.

The salesmen also receive constant help and advice from their district sales managers who often accompany them on a visit when necessary in order to help put over the sale.

This cooperation between the different members of the sales staff, together with that of the service department, is characteristic of our company. It is encouraging to the salesman to know that he has this support, that he can depend upon the others in his organization to aid in making the sale.

Ten Weeks Cooking School a Success Without Prizes

RODGER K. TENNEY

North Shore Gas Company.

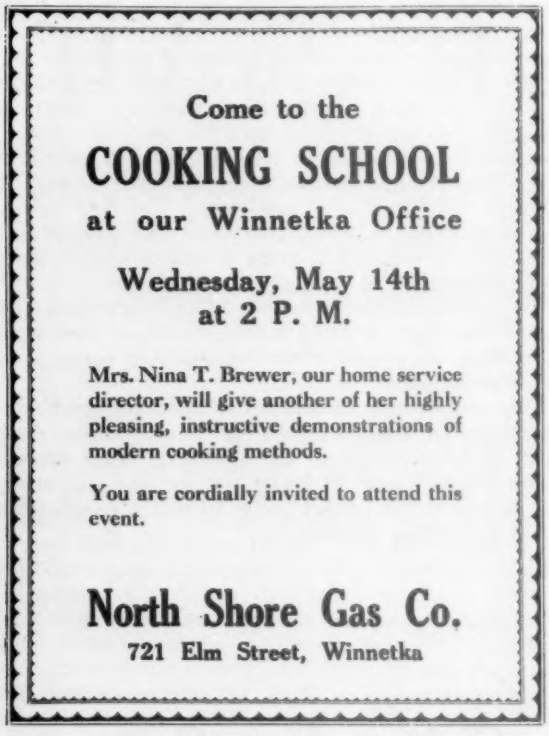
WITHOUT offering prizes, or any other inducements except the merits and entertainment of the instruction itself, the North Shore Gas Company conducted a successful ten weeks cooking school in the home service auditorium of its Winnetka, Ill. office. In place of the prevalent custom of enticing an audience of women through announcements that prizes would be given away, the company simply stated in its advertising where the school was to be held, the time and day, with a brief comment on the nature of the classes. Attendance at each school over the ten weeks' period averaged thirty-five women, with one week showing more than sixty women comprising the audience. While this attendance was not startling because of its number, it was satisfactory and encouraging when local conditions are considered.

Winnetka is a small city consisting, mainly, of homes above the average. The larger per cent of families have one servant or more, and the wife or mother of the household does little, if any, of the cooking. Facing such a situation, it was with some doubt that the cooking school was undertaken. However, the results more than vindicated the decision to conduct the classes.

Because the area which was to supply the audience for the schools was not representative of the average American community, it was decided not to offer prizes, because they would, in all likelihood, have been without any lure, but instead to offer the cooking instruction on its face value. Prizes might have helped, but this is doubtful even though they usually assist in attracting larger attendance. But the North Shore Gas Company was interested principally in getting women to attend because they wanted information. Any other inducements would have been of secondary importance under the circumstances.

To give publicity to the cooking classes weekly newspaper advertisements appeared in a Winnetka paper. These advertisements were of a relatively small size and were simply worded, lacking every element of sensationalism. In spite of absence of all boisterous ballyhoo in these advertisements, they proved effective, perhaps for one reason more than any other:—that the woman conducting the classes is known to most of the women who were among the potential audience, for she has made countless contacts in her work as home service director. The North Shore Gas Company believes implicity in the benefits to be derived from active home service work

among its customers, and it was the confidence shown by women in the home service director that aided in swelling the attendance at the cooking schools.


Come to the
COOKING SCHOOL
at our Winnetka Office
Wednesday, May 14th
at 2 P. M.
Mrs. Nina T. Brewer, our home service director, will give another of her highly pleasing, instructive demonstrations of modern cooking methods.
You are cordially invited to attend this event.
North Shore Gas Co.
721 Elm Street, Winnetka

One of Weekly Newspaper Ads

Other mediums also were used to let women know about the classes. One of these was a letter which was mailed to a selected list of women. Especial emphasis was laid on sending the letter to women who were prospects for new gas ranges and on whom salesmen were making calls. It was thought that if a woman could be influenced to attend one of these cooking classes, several of them, or perhaps the entire series, she would, during the course of the series, become more enthusiastic about purchasing a new gas range and hence be a better prospect for the salesman.

No selling was permitted either during the classes or afterward while women were still in the auditorium. This policy was enforced because the company did not want women to feel under any obligation whatever, or make them feel that they were being invited to hear the home service director only because the gas company wanted to sell them some appliance. Naturally, the purpose of the school was to either find or create prospects for appliances, and this it did, but selling talks had no place at the demonstrations.

One other phase of these cooking classes which undoubtedly helped greatly in making them a success was the use of a model kitchen, which is a prominent part of the home service auditorium. The auditorium itself is a spacious, well ventillated room, in which one hundred regulation theater seats provide comfortable seating arrangements. A stage at the front of the auditorium contains the model kitchen which consists of a gas range, gas refrigerator, kitchen cabinet, modern full enameled sink and drain incorporating several new features, a table and two small chairs. All of this equipment is in complete color harmony, on which so much stress is placed nowadays.

At each cooking class a complete meal was prepared, and each woman was served a small portion of one of the foods cooked. This helped show, through the taste appeal, just how good foods are that are prepared with modern kitchen devices. Numbered among the things included on the menu were various frozen desserts hardened in the gas refrigerator. The advantages of oven heat control also were pointedly brought out.

When a group of women will return week after week to learn new ways of cooking and new foods to prepare, or have prepared, for their families, it is undeniable evidence that the instruction and knowledge gained are really worthwhile. And it is testimony to the perennial desire of women to know more about cooking, even though that task is delegated to a hired cook in their homes.

Big 66 Round up Sale of Hot Water Heaters

W. B. STODDARD

ONE of the most successful sales in the history of the Texas Public Service Co., Austin, Texas, was that which took place last October, in a drive to put modern hot water heating equipment in Austin homes. The campaign was interestingly described by H. D. Ittner, commercial manager:

"As Texas is a big cattle country we decided to use a line of talk that would appeal to a large class of the population, so called our sale 'The Big 66 Round Up.' The campaign lasted for two weeks, and was initiated by a half page ad, showing at the top a herd of rushing cattle. This was headed 'The Stampede is on! Join the rush for modern hot water service, folks. The Ruud Rangers are after that old water heater of yours. They want to buy it at our special trade in allowance.' The rest of the ad told of our offer—$9.66 for the old heater of any type, to apply on a new Ruud heater. And this new heater was offered on very convenient terms; 66c down, and 18 months to pay the balance, apportioned on the regular monthly gas bill. 'Round Up' ads were run regularly all during the campaign, the wording being changed every few days, with the cow boy and cattle angle being retained in all of them. In all our ads we urged the public to take advantage of the convenient terms on which these heaters could be secured, and said: 'Come in today, or telephone one of our Ruud Rangers.'

"These Ruud rangers were four special outside men, who spent all their time digging up prospects, interviewing them, demonstrating the water heaters, and giving general publicity to the campaign.

THE BIG 66
ROUND-UP SALE is on
WANTED
EVERY HOME IN
AUSTIN
TO ENJOY THE LUXURY OF MODERN HOT WATER SERVICE
66c DOWN
18 Months On Balance
$9.66 FOR YOUR OLD HEATER
The big drive is on, folks! There is no reason at all why your home should not enjoy this time-saving, health-giving convenience. So economical to own—so easy to buy—especially at the special terms offered during this big water heater Round Up Sale.
No matter what kind of water heating equipment you now have, we'll buy it from you at our special trade-in allowance. Your old water heater helps you buy the advantages of constant hot water service, at the faucet, whenever and wherever you want it. Come in today, or telephone for one of our RUUD Rangers.
TEXAS PUBLIC SERVICE CO.
907 Congress
"Drive Carefully, Save Live and Property."
The Austin Lions Club.
TAKE ADVANTAGE OF THIS OPPORTUNITY TO Save

Above—Window Display Used During Campaign

Left—Newspaper Ad

"The firm used two windows to splendid effect in calling people's attention to the big sale. One of these was typical of the cow country and is shown herewith.

"Fifty new heaters were sold during the two weeks of the sale, and the effects of the campaign and demonstrations were felt for several months thereafter, people becoming interested in the modern style of water heating.

"We had staged a cooking school demonstration shortly before this and secured the names and addresses of many who were interested in the improved gas ranges. We figured that most of these would likely be interested in modern water heating as well, so this list was turned over to our Ruud Rangers and they interviewed each of these housewives personally, carrying with them one of the heaters, which they showed and demonstrated whenever given an opportunity. The outside men did much canvassing on their own account from leads supplied by friends and acquaintances, and also had many prospects furnished by satisfied users of these gas heaters."

Solid Tops for Burners Found To Increase Gas Consumption

ATTACHABLE solid tops, handled solely by house to house agents, have had wide sale. The top is designed to replace the grids of the open top range. It is claimed that these tops reduce the gas bill, do not cause the production of carbon monoxide, that they double the cooking capacity, that they are easily cleaned, that they keep the food from burning, apply an intense heat, protect the flames from drafts, that the cooking utensils are protected and prevented from tipping, that as many as four articles can be cooked with one burner, and that the burners are kept clean and prevented from clogging.

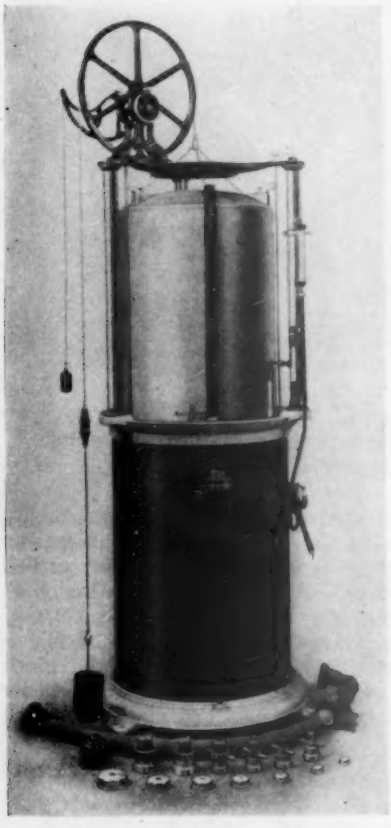
Considering these claims in the order named, comprehensive tests made by the Bureau of Standards have clearly shown that more gas must be used for doing the same heating when these solid tops are used, that the attachments are not safe, since they produce a dangerous quantity of carbon monoxide when placed on many stoves, and that such an attachment does not increase the cooking capacity of a burner, because it is not possible to cook on any part of the top under which no gas is being burned.

It is possible to keep the finished dishes warm; this, however, is merely a convenience and does not mean an increase in efficiency, for the same results can be accomplished on an open top range without using any more gas by merely turning it low beneath those utensils in which cooking is finished. It may be easier to clean such a top, but users have found it necessary to clean them more frequently than they have to clean the grids. The claims that the top keeps food from burning and that they apply an intense heat are contradictory; if the food is kept from burning it means the heat is not so intense as when a grid top is used. The flames are protected from drafts, but they are so well protected that it is impossible for the necessary air to reach them, a condition which is far more dangerous than an occasional draft.—*E. R. Weaver, Bureau of Stds., in U. S. Daily.*

EQUIPMENT NEWS

New "American" Provers

The American Meter Co., New York, N. Y., recently issued a new handbook on displacement measurements. In it is described their new provers. The new five and ten-foot "American" Provers afford more than twice the capacity of the former type.



These improved models enable the proving of larger meters at rates equal to or in excess of rated capacities. At the same time, the pressure loss at the meter inlet has been greatly reduced.

The airway diameter from the interior of the bell to the free end of the hose, has been increased to two inches in the 5-ft. prover and to three inches in the 10 ft. prover. The throw or capacity is thereby increased to considerably more than 100 percent.

A larger dry well, hose and connections have been incorporated to conform with the increase in the area of the airway.

A handy gate valve replaces the cock formerly used and regulates the flow of air from prover to meter. The inside diameter of the valve when fully open is the same as the diameter of the piping on either side. The type of valve finally adopted has received a 2 years exacting test of constant and satisfactory routine operation in our proving room.

Complete information for the proving room is given in the Company's new Handbook on Displacement Measurement.

New Powermatic Unit for Speeding Truck Deliveries

With truck manufacturers concerning themselves with how to get higher road speed, the Griswold Powermatic Corporation of Detroit, Mich., has placed on the market the Powermatic unit, which is

Powermatic Unit Installation

equally adaptable to new trucks as well as those in service, increasing truck efficiency by reducing loading and unloading time. The unit operates directly from a conventional transmission power take-off without any necessity of the driver leaving his seat. It is capable of loading 5 tons and will unload 7 tons with ease. It is adaptable to all makes of trucks. Quick acting jacks at the rear of the truck frame relieve the truck axle of all unloading strains.

The Powermatic installation includes the power unit with gears running in oil the long tool steel worm carried on frictionless thrust bearings, and the threaded cross head that actuates the body tilting mechanism. Massive I beams, carried on liberal sized rollers at the rear of the truck frame, take the place of the conventional body sills. To these I beams the tilting mechanism is connected.

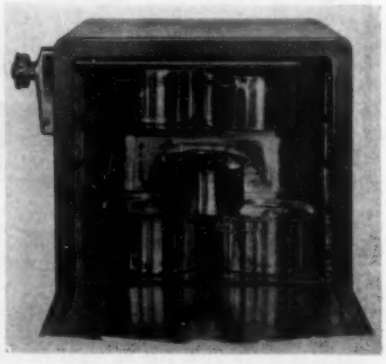
To operate, a lever in the truck cab is moved to engage the power unit. The idling truck engine furnishes ample power for practically all loads. Smoothly the body moves backward. As this movement continues, the rear edge of the truck body is lowered slowly to the ground while the front is elevated. As the load touches the ground—or loading dock—the truck is slowly driven a short distance forward.

By reversing this action the loading of heavy or bulky crates, boxes, timbers, pipes, coal, coke and the like is facilitated. With the aid of a winch mounted at the forward end of the truck body the loading and unloading is reduced to a one man operation.

New Model Added to Magic Chef Line

The American Stove Company, Lorain, Ohio, recently announced the addition of the Doric Model to their Magic Chef line of gas ranges. This model was specially designed for the small kitchen and while it will fit into 38-inch space its cooking and baking capacity is ample for ten people. It is slightly smaller than the Tiffin Model.

Special features are the roomy utensil compartment with full width double doors, removable burner tray, reversible broiler pan, concealed manifold and Red Wheel Lorain Oven Heat Regulator. The finish is old ivory with green crackled enamel trim. The door handles on the oven, broiler and utensil compartment are of ebonized bakelite with cadmium-plated fittings mounted on escutcheons of the



Oven containing six piece Whole Meal cooking set

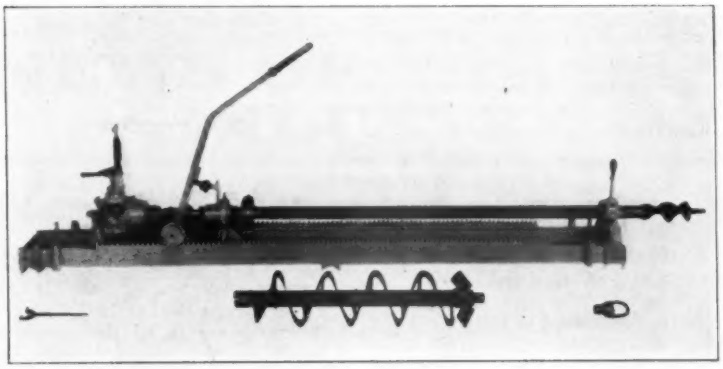
crackled finish. The cock handles are also of ebonized bakelite.

The oven of the Doric Model is large enough to accommodate the whole meal oven cooking set of six pieces. The oven and broiler linings are heavily enameled. Two racks are provided which slide easily into smooth enameled grooves.

An attractive brochure has been issued describing this new gas range.

New "Hydrauger"

The Hydrauger Corp., Ltd., San Francisco, Calif., recently issued a bulletin describing a new tool for boring under streets, highways, sidewalks, etc., to lay pipe, which is called Hydrauger. It is driven by compressed air and connected with running water, which passes through the boring bars, issuing in two streams at



Hydraulic auger. Reamer is shown below the machine

the auger. The water washes the borings back, leaving a clean straight hole. Feed ahead is accomplished by a reversible ratchet. The permanent pipe can be pushed in by hand or the machine ratchet may be used. A swivel is furnished for this purpose. Diameter of bored hole runs from 2½ inches to 5 inches without reamer and from 5 inches to 10½ inches with reamer. It is claimed satisfactory bores have been made up to 120 feet.

Copy of bulletin will be mailed on request.

Standard Gas Equipment Bring Out New Ranges

"Console" is a new model range recently brought out by the Standard Gas Equipment Corporation, New York City. The oven has been lowered on this range and the cooking top raised, thereby allowing the oven top to be utilized as working space. Other features include oven control, self-supporting oven racks, drawer type broiler, cupboard for cooking vessels and drawer for small utensils. The oven is insulated with rock wool and has a "heat-seal" refrigerator type door.

Another range announced is the "Compact." The outstanding feature claimed for this range is the convenience and capacity of the big table top. It is amply lighted on all sides; top has burner lighter. The hinged top, when raised, protects walls; when closed it gives range the appearance of a cabinet. It also embodies other features mentioned for the "Console."

These ranges are fully described in an attractive sales manual, which contains descriptions of other models as well. In this bulletin is an outline of Standard Gas & Equipment advertising and sales promotion activities, as well as a Guide for the Selection of Gas Ranges by Price Levels. A copy of the manual may be obtained upon request to the Standard Gas & Equipment Corporation.

The Caloroptic

The Connelly Iron Sponge and Governor Co., Elizabeth, N. J., has issued a booklet describing a direct reading calorimeter which is called the "Caloroptic." It is used for quick determination of the B. t. u. heat value of gas without the employment of calculations for corrections, for barometer, thermometer, pressure, etc.

It has the usual Bunsen burner tube, and in addition, a screw sleeve revolving on the burner tube at its base, which sleeve regulates and measures the air supply.

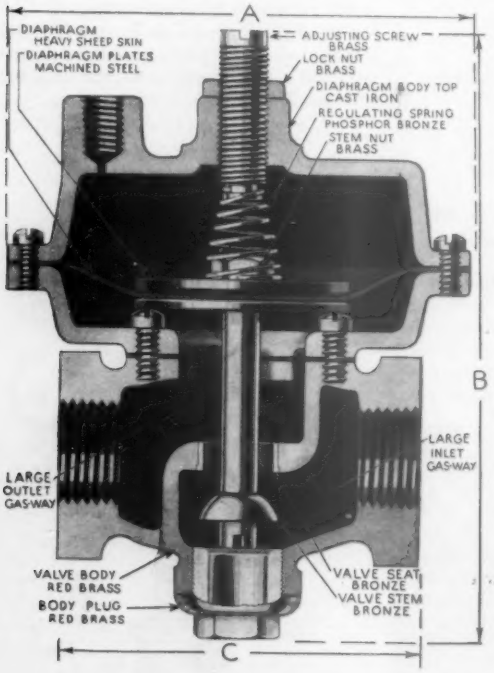
On the burner tube is a vertical scale of six principal divisions numbered 3-4-5-6-7-8 which indicate 300-400-500 etc., B. t. u.; between any two principal divisions are four spaces, each space equalling 25 B. t. u. On the revolving sleeve is a horizontal scale of 25 spaces; one complete revolution of the sleeve is equal to one smaller space on the burner tube scale and the 25 spaces on the former divides the latter 25 times, consequently one space on the sleeve scale is 1/25 of 25 B. t.u. or one B. t. u.

The booklet contains a number of curves and tables showing various B. t. u. readings. A copy of booklet will be mailed on request.

(Equipment News continued on page 76)

Barber Gas Pressure Regulator

The Barber Gas Burner Company, Cleveland, Ohio, recently issued a folder describing a new gas pressure regulator. Cut shows the working parts and how it functions. It has been designed for use



on all kinds of domestic gas burning appliances where a proper and constant pressure at the burner is necessary for efficient and economical operation. They are the low pressure, spring type, balanced principle, and are made in a range of sizes to control pressures to all household gas appliances.

Descriptive folder will be mailed on request.

Noiseless Roller Bearing Valve Wire Guide

The Lambert Meter Company announces an improvement in the construction of their large size meters known as a "noiseless-roller-bearing-valve wire guide." Much of the noise that is sometimes heard in the operation of large size meters is the friction and vibration noise of the metal valve-wire sliding in the usual metal guide. Furthermore, this metal to metal frictional action aside from being noisy produces wear on both parts which ultimately causes misalignment of the valve cover on the seat or grating.

The new Lambert type of noiseless bearing (30 lt. size illustrated, larger sizes appropriately designed for their required strength) consists of a sturdy tinned brass base with an inverted U tinned brass wire sturdily soldered into the base:—on each leg of the wire a Bakelite or vulcanized fibre roller is located. The valve-wire rides or slides reciprocatingly between these rollers. This action of metal against a non metal roller is practically noiseless, and frictionless.

Michigan Reports on Sale of Gas in 1930

Michigan gas companies sold approximately thirty-six billion cubic feet of gas in 1930 according to compilations just completed by the Michigan Public Utility Information Bureau. Sales in the State were 4.7 per cent greater than those for 1928, which were ahead of all records up to that time. They fell 5.3 per cent behind those for 1929 which had been brought to new high levels by the unusual industrial activity of the early months of that year.

The outstanding sales gain of the year was in house-heating. Five years ago house-heating with gas was almost an unknown luxury in Michigan. During 1930 the use of gas for this purpose accounted for close to 2½ per cent of the total sales.

Sales for domestic service were two per cent under those for 1929, but approximately 6 per cent above those for 1928.

The loss in industrial and commercial sales represents the effects of general industrial conditions.

More than 725,000 customers were served by the Michigan gas utilities during 1930. The great bulk of these—close to 700,000—were domestic customers.

Domestic gas sales constituted 72½ per cent of the total sales; industrial and commercial 25 per cent, and house-heating 2½ per cent.

Extension of gas service to communities which hitherto have not enjoyed such service continued during 1930 as an outstanding phase of the development of the industry in Michigan. During the year gas was taken to 29 additional Michigan communities through high pressure extensions from central producing plants.

Whereas five years ago only 70 Michigan towns had gas service, the end of 1930 found 266 communities with a gas supply. Plans for the coming year call for taking gas to 18 additional communities.

Natural gas has been found in the Mt. Pleasant area, but distribution and utilization wait on the development of sufficient reserves to justify the construction of pipe lines from the wells to nearby towns and the expense involved in changing domestic and industrial equipment from a manufactured gas basis to a natural gas basis. Preliminary preparations have been made to serve Mt. Pleasant when that city feels that the change is economically desirable.

Gas Utility Revenues Off in November

Revenues of manufactured and natural gas utilities aggregated $51,533,656 in November, a decline of 3.4 percent from the same month of the preceding year, according to reports to the Statistical Department of the American Gas Association from companies representing nearly 90 per cent of the utility distribution of manufactured and natural gas.

The manufactured gas companies reported revenues of $31,554,991 for November, a drop of 1 per cent from a year ago, while revenues of the natural gas concerns totalled $19,979,565, or approximately 7 percent less than for November 1929.

Sales of manufactured gas reported for November totalled 29,585,612,000 cubic feet, a decline of 1.7 percent, while natural gas sales for the month were 41,662,311,000 cubic feet, a drop of nearly 11 percent. The more marked curtailment in natural gas sales was the result of the relatively larger proportion of industrial business handled by these companies, as natural gas sales for industrial purposes declined from 17,149,954,000 cubic feet in November 1929 to 13,308,392,000 cubic feet in November 1930, a drop of more than 22 percent.

This same tendency toward sharp curtailment of industrial sales was also manifest, although to somewhat less extent, in territories served with manufactured gas. In the East North Central states, comprising Illinois, Indiana, Michigan, Ohio and Wisconsin, manufactured gas sales for industrial purposes declined by nearly 16 percent, the loss being most pronounced in such states as Indiana and Wisconsin, which showed a drop of some 20 percent in this class of business. In New England the decline in industrial sales was much less severe, and two states, Massachusetts and Connecticut, registered slight increases in gas sold for industrial purposes.

Sales Course for Dealers

The Brooklyn Union Gas Company, Brooklyn, N. Y., are conducting a dealers' course, which consists of 20 lectures given weekly, includes the A. G. A. Course in Domestic Gas Salesmanship, as well as lectures on the company's policy and discussions of the appliances approved by the A. G. A. and sold by The Brooklyn Union Gas Co. The instructors are Mr. E. J. Devlin, Research Engineer and Mr. T. B. J. Merkt, Industrial Engineer.

NEWS OF THE GAS INDUSTRY

Extend Natural Gas Service

Central Public Service Corporation has announced extension of natural gas service to Alabama City and Attalla, Ala. with distribution being directed from Gadsden, a nearby city. A half dozen or more cast iron pipe plants are located in these cities, also a Goodyear rubber factory and a manganese plant. These industries will use considerable gas for fuel.

Plan Extension Program for 1931

The Birmingham Gas Company will carry out an extension and improvement program during 1931 which will involve the expenditure of $612,000 according to R. E. Chew, vice-president and general manager. He points out that the company has not cut salaries and does not intend any reductions. Instead it is proposed to take advantage of low commodity prices and cheap money rates to make improvements which "will produce a return just as soon as business begins to recover."

"The gas industry suffered less this past year than almost any other," says Mr. Chew. "The volume of industrial and commercial consumption of gas was considerably reduced. However, there is no element of over-production or over-expansion and the industrial use of our product will come back stronger than ever as general business recovers. The rapid advance in the utilization of gas fuel for heavy duty industrial and commercial operations that has been so marked the past decade is in itself a guarantee of the continuation of this business as business itself recovers."

Consolidated Gas Company Opens 37 New Ovens

Ten million cubic feet of gas were added to New York City's daily supply recently when thirty-seven new ovens were put into operation at the Hunt's Point plant of the Consolidated Gas Company. George B. Cortelyou, president of the company, started the machinery that put the first of the ovens into service.

The additional ovens give the plant a total gas capacity of 30,000,000 cubic feet a day, and the company a daily capacity output of 247,000,000 cubic feet.

The cost of the company's addition to its plant was said to be $4,000,000, bringing the total cost of the plant, including a third 250-foot smokestack which the new ovens necessitated, to $26,000,000. From now on 2,625 tons of coal a day will be consumed at the plant, which it was learned, will give off, in addition to its gas, a daily quota of 1,600 tons of coke.

Wyoming Towns to Get Natural Gas

A number of towns in Southern Wyoming will soon have natural gas as the result of an arrangement recently negotiated for a branch from one of the large pipe lines originating in Texas. The line which will be tapped passes near Omaha, Nebraska. Torrington, Guernsey, Scotts Bluff, Wheatland, and Douglas are Wyoming towns which have already made arrangements for service from the new branch.

Michigan Utilities Plan Construction Work

Michigan electric power and gas utilities are planning to spend approximately $40,000,000 in new construction during the coming year, according to a compilation of budget estimates just completed by the Michigan Public Utility Information Bureau.

This $40,000,000 will be well distributed throughout the state, from the southeastern industrial section to far away Keweenaw Peninsula.

The gas companies of the state are planning to spend close to $7,000,000 and the electric power companies have budgets running close to $33,000,000.

The electric utility plans call for added generating capacity in power houses, construction of transmission lines to reach new territory and to better serve old territory, the erection of office and service buildings, the building of farm lines, the establishing and improving of switching yards and substations, and like betterments.

The gas companies are planning improvements in generating and distribution facilities, the construction of new holders, and the building of high pressure lines to take gas to communities and sections which have never hitherto had service. It is expected that between 18 and 25 additional communities will be supplied with gas before the end of the present year.

New Company to Build Natural Gas Lines

The Southern Fuel Company is a newly organized corporation the stock of which is jointly owned by the Southern California Gas Company and Southern California Edison Company interests.

This Company will spend seven million dollars during the coming years in building pipe lines, compressor stations, and installing other equipment to bring gas into the metropolitan district of the City of Los Angeles.

A large line probably twenty-six inches in diameter, having a capacity of one hundred and thirty million cubic feet per day, is to be laid from the San Joaquin Gas and Oil Fields.

This capacity is equal to about one-third of the total amount of gas handled in the metropolitan area at present. On account of the rapid depletion of gas producing areas in the Los Angeles Basin, this new supply of gas will be needed to meet the demands of the domestic and industrial consumers of the gas companies in Southern California and the fuel requirements of the Southern California Edison Company's steam plant at Long Beach.

The officers and directors of the Company have been chosen from the officers of the operating companies of the controlling interests and are as follows:—Alexander B. Macbeth, President and General Manager; F. B. Lewis, Vice President and Assistant General Manager; George C. Ward, Vice President; Franklin S. Wade, Vice President; D. M. Trott, Secretary and Treasurer.

The directors are: R. H. Ballard, Addison B. Day, LeRoy M. Edwards, F. B. Lewis, Alexander B. Macbeth, W. C. Mullendore, Franklin S. Wade, G. C. Ward.

This Company will employ several hundred men during the period of construction. The construction work, however, will probably not commence until sometime in April. The distribution of money for labor and material in connection with this project, will contribute to the rehabilitation of business conditions during the coming year.

Columbia Gas & Electric Co. Acquire Additional Natural Gas Reserves

The Columbia Gas and Electric Corporation has completed negotiations for the purchase of additional natural gas reserves in Kentucky from the United Carbon Company, it was learned recently.

The purchase of the reserve will provide Columbia with additional sources, from which the new markets in eastern States can be supplied.

It was reported in September, that United holdings in eastern Kentucky

had been expanded to more than 90,000 acres.

Columbia has been purchasing natural gas from United for some time, and the present deal represents additional contracts, it was explained. Columbia's pipe lines extend to the vicinity of United properties and are now being used for the transportation of natural gas from those fields.

United Carbon formerly devoted its entire attention to the production of carbon black, but in recent years it has been found profitable to divert a substantial proportion of its natural gas production to meet the demands for industrial fuel. The company's principal holdings are in the southwest. Its total holdings of natural gas properties are more than 1,500,000 acres. Its natural gas plants have a total capacity of more than 80,000,000 cubic feet daily.

Midland United Announce Extensive Construction Program

The construction budgets of public utility companies in Indiana, controlled by the Midland United Company, provide for proposed expenditures in 1931 aggregating approximately $22,000,000 according to an announcement made today by Samuel Insull, Jr., president of the company.

The Midland United Company is a holding or investment company controlling electric, gas, and transportation companies operating in practically every section of the state.

"The construction budegt for our group of companies in Indiana provides for additions and improvements throughout the territory served by our subsidiaries," said Mr. Insull, Jr.

"Important additions will be made to the electric transmission systems of Midland electric light and power subsidiaries, and betterments will be made to our electric and gas facilities wherever necessary.

"During the eight years, since 1923, when the first steps were taken in the formation of the Midland group of companies a total of $142,780,000 has been spent by subsidiary companies for expansion and construction in the state of Indiana. During last year alone Midland subsidiaries invested approximately $23,000,000 in additions and other improvements to their facilities for serving the public."

Gets Additional Gas Line Permit

A. J. Hardendorf who is serving some cities in Prowers and Bent county, Colorado with natural gas from his pipe line which gets its supply in Stevens county, Kansas, has been given permission by the public utility commission to extend his line and serve gas to Granada, Springfield, Walsh and Holly, Colorado.

Convention Calendar

February

24-25 Pacific Coast Gas Association Accounting Section Conference, Los Angeles, Calif.

26-27 A. G. A. Eastern Natural Gas Sales Conference, Hotel Shenley, Pittsburgh, Pa.

March

5-6 Pacific Coast Gas Association, Technical Section Conference, Los Angeles, Calif.

10-11 Oklahoma Utilities Association, Oklahoma City, Okla.

12-13 Illinois Gas Association, annual convention, Springfield, Ill. George W. Schwaner, 205 Illinois Mine Workers Bldg., Springfield, Ill., secretary-treasurer.

17-18 Ohio Gas and Oil Men's Association Convention, Deshler-Wallick Hotel, Columbus, Ohio. William H. Thompson, Secretary.

23-27 National Home Service Conference, Edgewater Beach Hotel, Chicago, Ill.

27 New Jersey Gas Association, Trenton, N. J.

April

8-10 A. G. A. Distribution Conference, St. Nicholas Plaza Hotel, Cincinnati, Ohio.

10 Maryland Utilities Association, Baltimore, Md.

16-18 Missouri Association of Public Utilities, Excelsior Springs, Mo. Jesse Blythe, 103 West High St., Jefferson City, Mo., assistant secretary.

13-15 Mid-West Gas Association annual convention, Dubuque, Iowa. Joe Carmichael, 310 Crocker Bldg. Des Moines, Iowa, Director.

23-24 A. G. A. Accounting Conference, Stevens Hotel, Chicago, Ill.

28-30 Pennsylvania Gas Association, annual meeting, Galen Hall, Wernersville, Pa. Frank W. Lesley, secretary, 127 W. Market St., York, Pa.

Gets Gas Franchise

The city council of Longmont, Colorado, awarded the Public Service Company of Colorado a twenty year franchise to serve the city with natural gas, reserving the right to purchase the gas plant whenever it is deemed desirable. Longmont is along the line of the company's Denver-Fort Collins-Cheyenne pipe line, the gas supply coming from Amarillo, Texas. About $75,000 will be spent to connect up Longmont. Clare N. Stannard, vice president and general manager of the Public Service Company addressed the council, telling the aims and objects of his company.

Standard Gas & Electric Co. to Spend $43,500,000 in 1931

A new construction program, calling for the additional investment of more than $43,500,000 during 1931 at the subsidiary and affiliated companies of Standard Gas and Electric Company, has been announced by John J. O'Brien, president.

Properties of the Standard Gas and Electric system extend over twenty states and serve a population of 6,300,000 in 1,630 cities and towns, and the additions and extensions planned in this construction program are made necessary by the constantly increasing demands for service.

Projects now in progress throughout the Standard system, and which will not be completed during 1930, involve a total of $12,911,000, which is included in the 1931 budget. The total budget may be segregated as follows: electric department, $31,176,159; gas department, $6,206,377; and other departments, including general construction, $6,213,721.

Two California Towns Supplied With Butane Gas

The Southern California Gas Company is now supplying residents of Palmdale and Mojave, California, with Butane gas. The plant at Palmdale has two storage tanks of 1950 gallon capacity each and the tanks at Mojave have a capacity of 2900 gallons.

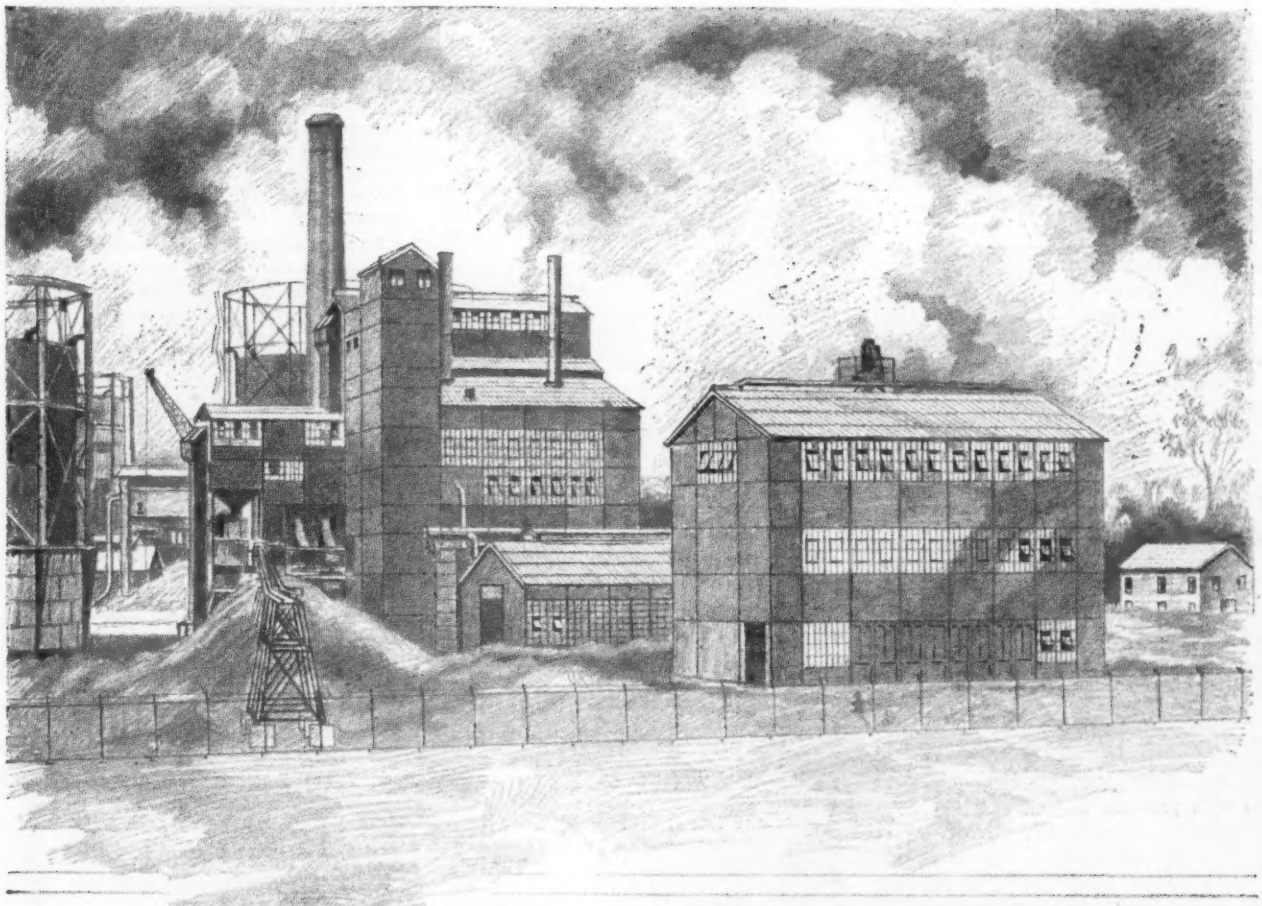
Change in Ownership

Operation of the Indiana Gas Light Company at Noblesville, Ind., has been begun by the Indiana Electric Corporation. The purchase authorized by the Public Service Commission, includes besides that company the Colfax Electric Company, Stilesville, Electric Company, the West Lebanon Heat, Light and Power Company and the Zionsville Water and Light Company. The purchases, it was said by the controlling company, would have no effect on any of the local personnels or policies.

Declare Quarterly Dividend

The Board of Directors of the West Ohio Gas Company has declared the regular quarterly dividend of one and three quarters per cent on the outstanding 7 per cent Class A Preferred Stock of the Company, payable March 2, 1931, to stockholders of record February 14, 1931.

(News continued on page 80)



STAMFORD GAS & ELECTRIC CO., *Stamford, Conn.*

Another— Gas Utility Produces Its Base Load With Coal Gas.

Glover-West Vertical Retorts, with a daily capacity of 1,100,000 cu. ft., were installed at Stamford in 1926. This is the plant where the A. G. A. Carbonization Committee conducted the tests for their report at the 1927 convention.

The design of Glover-West Retorts is such that you get maximum yields of gas, coke and tar with minimum operating costs.

Other Glover-West Installations

Fitchburg, Mass.
Springfield, Mass.
Portland, Me.
Ottawa, Ont.
Vancouver, B. C.
Victoria, B. C.
Watertown, N. Y.
Malden, Mass.
Fargo, N. D.
Toronto, Ont.
Santos, So. America
Pernambuco, So. Amer.
Santiago, So. America
Buenos Aires, So. America
Pawtucket, R. I.
Fall River, Mass.
Faribault, Minn.
Halifax, N. S.
Belleville, Ont.
Rio de Janeiro, So. America

WEST GAS IMPROVEMENT COMPANY, 441 Lexington Ave., New York

Builders of Coal Gas Plants

Glover·West

VERTICAL·RETORTS

Natural Gas is Pinching the Coal Barons

The Coal Operators Association of Colorado, through its attorney State Senator George C. Manly, while not using the exact words, are showing that the advent of natural gas into Colorado has hurt the coal men more than they have been willing to admit; the following bills submitted by Senator Manly as proof:

1—The appointment of a state fuel conservator to supervise the heating of all state institutions.

2—The use only of coal as fuel in state institutions, unless such use is declared impractical by the fuel conservator.

3—No architect shall be paid for his services in connection with the construction of a state-owned building unless provision is made for the installation of a heating plant using black or powdered coal produced in Colorado.

4—Authorizing the heads of state institutions to make ten-year contracts for the installation of heating plants and to issue income bonds for the payment of such plants and for fuel.

5—Authorizing the purchase of heating plants by heads of state institutions, on the installment plan.

6—Authorizing the governor to appoint a combustion engineer to make a survey of all heating plants, owned by the state.

Announce Plans for Construction of High Pressure Natural Gas Line

With the American Smelting & Refining Company of El Paso, Texas, having pioneered with the El Paso Natural Gas Company in perfecting the use of natural gas in its reverberatory furnaces, and finding the fuel to give efficient and economical results, plans now have been announced for construction of a $6,000,000 high pressure natural gas line from El Paso to Douglas and Bisbee, Ariz., and Caranea, Mexico.

Construction is to start immediately on the 275-mile line, which is scheduled to be completed by Aug. 1, with approximately 300 men to be employed on its construction.

The project is being handled by the Western Gas Company, a subsidiary of the El Paso Gas Company and is to serve the following companies: Phelps-Dodge Corporation, Calumet & Arizona Mining Company, Cananea Consolidated Copper Company, Arizona Edison Company, and adjacent and intervening territory. Announcement of the plans was made in El Paso by Paul Kayser, president of the El Paso Natural Gas Company.

While Texas natural gas has been piped out of the Panhandle to other states, this marks the first instance the fuel is being piped west. A branch line is to be built from Bisbee, Ariz., south to the city of Cananea, in the state of Sonora, Mexico, a mining town of 15,000 inhabitants. Its chief industry is the mines and smelters of the Cananea Consolidated Copper Company, S. A. The Mexican corporation is known as Compania Occidental de Gas, S. A.

Four compressor stations will be built. The pipe line will be 12¾ inches in diameter and will be capable of operating at a pressure of 990 pounds.

The Engineers Public Service Company has obtained a three-year option to buy stock control of the El Paso Natural Gas Company, in connection with the financing, according to the announcement by Mr. Kayser.

Construction of the line is to be supervised by Stone & Webster Corporation, while designs and plans are being prepared by Ford, Bacon & Davis. Contract for construction of the gas line to Arizona has been let to Bechtel Kaiser Company, Ltd., of San Francisco, with C. P. Bedford in charge of construction.

Upon completion of the Western Gas Company's pipe lines the combined payroll of the two allied companies will be substantially $185,000 a year and the combined supplies required for operation of the lines will call for an expenditure of approximately $200,000 annually.

Natural Gas Convention Headquarters

"The South's Finest and one of America's Best," as heard on the air from Station WREC, aptly describes this ultra-modern Hotel Peabody. From the basement to the Roof Garden everything has been done to substantiate its claims.

Natural gas transported from the Monroe Fields by the Memphis Natural Gas Company and distributed in the City by Memphis Power & Light Company, has aided materially in making actual this dream of the perfect hotel.

The gas is supplied from the Intermediate Pressure System through a six-inch service passing through a manifold of four No. 5 Emco meters before the Chaplin-Fulton Regulator reduces the pressure to one pound. From the time it passes through this regulator until it joins the air as products of combustion, it is handled automatically. Passing through a 6" header in a trench along the front of the three 268 HP Sterling boilers, it is ready to do the bidding of the Merit Control which gets its orders from the entire steam system. The steam pressure desired is 185 pounds gauge, and upon the slightest fluctuation in load the control functions smoothly and positively to place the pressure on this point. As the control goes into action, the damper in the breeching and the gas supply valve, being linked mechanically, operate simultaneously. This feature with the combination of proper baffling, and Webster burners, allows operation on the low furnace draft of .01 to .15 inches of water.

As the control is set to deliver 25, 100, and 150 percent boiler rating as the demand varies, and, as each step can be set to maintain the highest practical CO_2 it can easily be seen why the stack temperature rarely approaches 500°. This provides a temperature differential of approximately 125°F.

All possible by-pass arrangements of meters and regulators have been provided, but to further insure no interruptions there is a complete oil supply system with Hammel burners which can be placed in service almost instantly if it should become necessary.

The small pipe and fittings room was large enough for the gas meters, regulators and fuel oil pumping set, so that the coal bunkers were converted into a tool room and work shop and still there was plenty of room for the pipe-racks and fittings.

The installation was made by the Webster Engineering Co., a subsidiary of Surface Combustion Company.

Second National Home Service Conference to be Held in Chicago

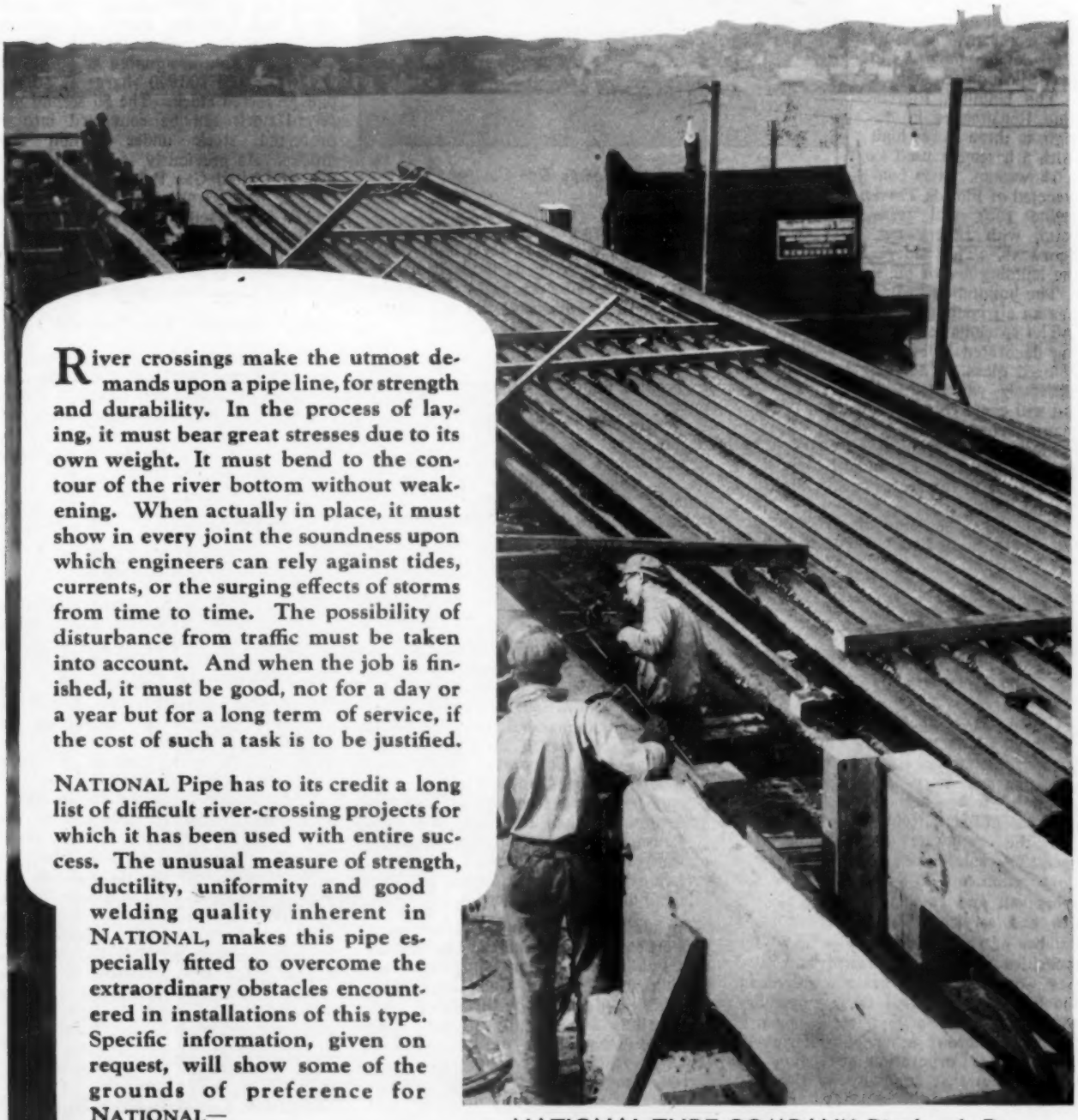
The Second National Home Service Conference will be held at the Edgewater Beach Hotel, Chicago, March 23, 24, 25 and 26, 1931, sponsored by the Home Service Committee of the American Gas Association and the Home Service Subcommittee of the Women's Committee, N. E. L. A.

March 23 and 24, will be devoted to the presentation of material on the use of electricity in the home. One day of the Conference, Wednesday, March 25, will be devoted to discussions dealing with organization and operation of Home Service Departments, either gas or electric.

Thursday, March 26, will be devoted to the presentation of subject matter relating to gas appliances that Home Service women should know in the operation of their departments; in addition, suggested methods in presenting this information to customers. Specialists in these subjects will appear on the program. The subjects will include among others, "What Home Service Workers Need to Know About Gas," "How to Present this Information to Homemakers" and "Equipment Studies in the Change-over from Manufactured to Natural Gas."

(News continued on page 82)

BETWEEN THE SHORE LINES EXTRA SECURITY IS NEEDED



River crossings make the utmost demands upon a pipe line, for strength and durability. In the process of laying, it must bear great stresses due to its own weight. It must bend to the contour of the river bottom without weakening. When actually in place, it must show in every joint the soundness upon which engineers can rely against tides, currents, or the surging effects of storms from time to time. The possibility of disturbance from traffic must be taken into account. And when the job is finished, it must be good, not for a day or a year but for a long term of service, if the cost of such a task is to be justified.

NATIONAL Pipe has to its credit a long list of difficult river-crossing projects for which it has been used with entire success. The unusual measure of strength, ductility, uniformity and good welding quality inherent in NATIONAL, makes this pipe especially fitted to overcome the extraordinary obstacles encountered in installations of this type. Specific information, given on request, will show some of the grounds of preference for NATIONAL—

America's Standard Wrought Pipe

NATIONAL TUBE COMPANY · Pittsburgh, Pa.
Subsidiary of United States Steel Corporation

NATIONAL PIPE

Modern Gas Building Opened in Tampa

New Home of the Tampa Gas Company

The Tampa Gas Company, Tampa, Fla., recently opened their handsome new home with a formal reception to the public. Mr. John Gribbel, President and Mr. D. J. Collins, Vice-President of the company, both of Philadelphia, took part in the dedication ceremonies.

The building, Florentine Renaissance in design, is three stores high with a basement used as a showroom. It is constructed of Florida Travertine rock and terra cotta, with silvery marquises over the doorways. The sidewalks surrounding the building are of polished terazzo.

The building is heated by gas and also has an air cooling and purifying system.

The spacious lobby has a paneled ceiling decorated in blue, with skylights of colored glass. The floor is of terrazzo intricately patterned. Principally lighting will come from half a dozen or more magnificent crystal lighting fixtures modernistic in style. Additional indirect lighting fixtures of standard style light up corners in the rear, beneath the mezzanine floor.

Floodlights set into the recesses of the wall immediately beneath street show windows are designed to flood the entire lobby with a low-level light which will make the lobby particularly attractive to passers-by at night and which will set off to advantage the gas ranges, refrigerators and other appliances on display.

Above the lobby in the rear is the mezzanine floor, for the use of the company's clerical department. Marble staircases lead to the mezzanine and the basement.

The offices on the second and third floors, which are being let to private tenants are modernly equipped.

Roscoe Nettles is the general manager of the Tampa Gas Company.

United Gas Public Service Company Newly Organized

United Gas Public Service Company, which has been incorporated under the laws of Delaware, will be the principal operating subsidiary of United Gas Corporation. It has been organized for the purpose of simplifying the operations and the corporate structure of the operating subsidiaries of United Gas Corporation and to provide for the development and extension of the properties and service. The properties of a number of present subsidiaries all of the securities of which are owned by United Gas Corporation are being acquired by the new company and these subsidiary companies will be liquidated. Securities of numerous other subsidiaries of United Gas Corporation are being acquired from that company by the new company. All of the securities of every kind to be presently issued by the new company will be owned by United Gas Corporation.

United Gas Public Service Company will own and operate an extensive natural gas system covering portions of Texas, Louisiana, Mississippi, Alabama and Florida, including natural gas wells and producing acreage, pipelines and distribution systems. These properties include the properties of Louisiana Gas & Fuel Company, the gas production properties in Louisiana owned by Texas-Louisiana Production Corporation, the gas transmission and distribution properties hitherto owned by Texas-Louisiana Pipe Line Corporation and Southwest Distributing Company and the new pipeline extending from a point north of Jackson, Mississippi, to Mobile, Alabama; Bogalusa, Louisiana; Gulfport, Mississippi, and Pensacola, Florida, as well as certain other natural gas production, pipeline and distribution properties.

In addition to owning and operating properties above referred to, United Gas Public Service Company is now acquiring from United Gas Corporation and will own directly or through subsidiaries all or substantially all and in no case less than 97% of the common stocks, substantial percentages of preferred stocks and in most cases large percentages of bonds and debentures of companies owning properties in Texas and Louisiana which are interconnected for the most part with properties now being acquired and to be directly owned by the Company. Included among the companies whose securities, as above stated, are now being acquired by United Gas Public Service Company are The Palmer Corporation of Louisiana, Southern Gas & Fuel Company, United Production Corporation, Dixie Gas and Utilities Company, Dixie Gulf Gas Company, Houston Gulf Gas Company, Houston Gas and Fuel Company, Southern Gas Company, Southern Gas Utilities, Inc., Northern Texas Utilities Company and South Texas Gas Company.

United Gas Public Service Company will have an authorized capitalization consisting of 500,000 shares of preferred stock and 2,500,000 shares of common stock. Of the preferred stock, 200,000 shares are now designated as $6 preferred stock and 300,000 shares as $6 second preferred stock. The $6 second preferred stock can be converted into $6 preferred stock under certain conditions. As previously stated, all securities of United Gas Public Service Company to be presently outstanding will be owned by United Gas Corporation.

Sign Contract for Natural Gas

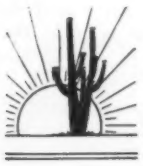
The Southern Natural Gas Corporation has announced that a contract has been signed with the Georgia Power Company to supply Columbus with natural gas. Work on the project will be started at once by the power company.

Petitions Granted

The Commission has granted petitions from the New York Central Electric Corporation to extend its gas mains in the towns of Cohocton, Erwin, Bath and Campbell, Steuben County and it has also granted a petition of the New York State Electric & Gas Corporation for permission to construct an extension for furnishing gas in the town of Wayland. The Commission also approved the exercise of franchises granted to the Wayland Light & Power Company to the New York State Electric & Gas Corporation. Beginning at Corning, the proposed gas line will pass through the villages of Painted Post, Cooper, Curtis, Campbell, Savona, Bath, Cohocton, North Cohocton and Atlanta and through the town of Wayland en route to Dansville. It is proposed to build a high pressure main along the highway between Corning and Danseille.

Approve Construction Budgets

The directors of the Public Service Corporation of New Jersey and subsidiary companies have approved construction budgets for 1931 totalling $26,407,971. This sum is available for expansion and additions and improvements to the electric, gas and transportation branches of Public Service throughout the New Jersey territory served by the operating companies.



As Distinguished in Sales Value to the Commercial Manager as it is in Eye Appeal and Lasting Satisfaction to Your Customers.

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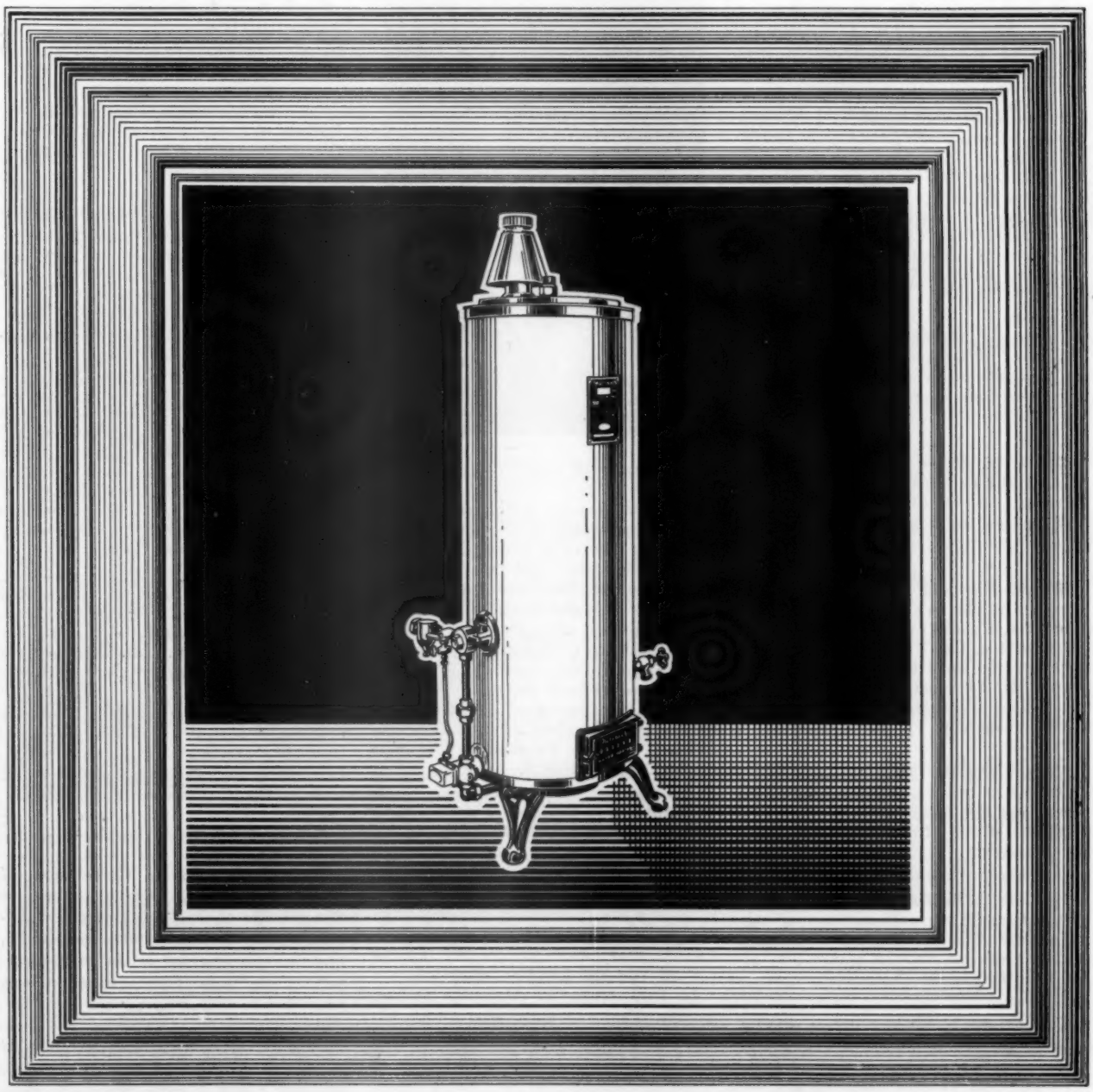
SELF-ACTION STORAGE GAS WATER HEATER



WELSBACH COMPANY · · · GLOUCESTER CITY · · · N. J.

OFFICES IN PRINCIPAL CITIES

PERSONALS

James L. Richards recently resigned as President of the Massachusetts Gas Companies and was elected Chairman of the Board of Trustees. Mr. Richards had been head of this organization since 1902.

The Trustees and Directors of the Massachusetts Gas Companies and the subsidiary companies presented to Mr. Richards an address, in book form, engrossed on parchment and hand-illuminated, reviewing what had been accomplished under his administration.

H. Lee is the newly elected president of the Massachusetts Gas Companies, succeeding Mr. James L. Richards, who resigned recently.

Frank J. Pfeiffer has been promoted from assistant general auditor to assistant secretary and assistant treasurer of the Louisville, Ky., Gas & Electric Company and subsidiary companies.

Mr. Pfeiffer began his services with the Louisville Gas Company, a predecessor of the Louisville Gas and Electric Company, in June, 1909, in the commercial department.

Julius L. Hecht, Vice President in Charge of Operation of the Public Service Company of Northern Illinois, Chicago, was recently presented with a 25-year service pin.

Ernest M. Miller has been promoted from Assistant Supervisor, Employment Division, to Supervisor, Employment Division of the Philadelphia, Pa., Gas Works Company.

W. A. Rheinold, laundry equipment salesman of the Wyandotte County Gas Company, Kansas City, Kansas, was the state winner for Kansas, in a contest sponsored by the Hurley Machine Company. Mr. Rheinold received as prizes a No. 1 Thor Washer, a cash prize and a silver loving cup.

Elmer Rogers, laundry equipment salesman of the Joplin, Mo., Gas Company, was the winner for the State of Missouri in the Hurley Machine Company contest.

Harriett C. Brigham became Director of the Home Service Department of the Oklahoma Gas & Electric Company, Tulsa, Okla., upon the resignation of Miss Ruth Van Sant.

Col. Oscar H. Fogg, Vice-president of the Consolidated Gas Company, was elected President of the Engineers Club of New York at its annual meeting on Tuesday, January 27.

Mr. Fogg's election to the presidency follows several years of active participation in the affairs of the Club. He served as first Vice-president during 1930.

Dr. Lawrence Wade Bass, who, for two years, has been a member of the Executive Staff of Mellon Institute of Industrial Research, Pittsburgh, Pa., has resigned, to accept the post of Assistant Director of Research of the Borden Company, New York, N. Y.

Louis C. Smith, formerly vice-president and division manager of the New York Power and Light Corporation, on January 1 joined the American Gas Association as assistant to the managing director. In announcing this appointment, Alexander Forward, managing director of the association, said that Mr. Smith brought to his new work many years experience as a public utility operator.

Louis C. Smith

Entering the employ of the Philadelphia Gas Works, Philadelphia, Pa., Mr. Forward said, Mr. Smith, shortly after his graduation from the Mechanical Engineering Department of the University of Pennsylvania, spent three years in distribution work in Philadelphia, becoming assistant superintendent.

Mr. Smith's early experience in gas production was obtained in experimental work at the Point Breeze Plant.

During a long connection with the United Gas Improvement Company he had charge of the inventory and appraisal of the distribution system of the Omaha Gas Company, and became engineer, then manager of the Fulton County Gas and Electric Company.

In 1925, when the Mohawk Hudson System was developed, Mr. Smith became president of the Fulton County Gas and Electric Company in charge of all its operations.

In 1927 he was made a vice-president and division manager of the New York Power and Light Corporation and for the past several years has acted in that capacity handling operations in the Mohawk and Schenectady divisions.

Donald Schaar, formerly a sales engineer in the general office of the Southern California Gas Company, has been transferred to the Southern Division at Redondo, California, as Industrial Engineer.

Harry Dunavan recently retired as manager of the Domestic Section of the New Business Department of the Peoples Gas Light & Coke Company, Chicago, Ill.

C. W. Baughn has been appointed Superintendent of Distribution of the Portsmouth, Ohio, Gas Company. Mr. Baughn was formerly connected with the Lake Shore Gas Company.

Willard J. Morrow succeeds G. W. Baughn as Superintendent of Distribution of the Lake Shore Gas Company, Ashtabula, Ohio.

Thomas R. Weymouth recently joined the Columbia System as Vice President of the Columbia Engineering and Management Corporation with headquarters in New York City.

Mr. Weymouth, who became President of the Oklahoma Natural Gas Corporation in 1928 and Chairman of the Board recently, is recognized as one of the foremost men in the natural gas industry. Since 1903, when he entered the oil and gas fields in Pennsylvania, Mr. Weymouth has been engaged in engineering and executive capacities with several large companies, the principal of which was the Iroquois Gas Corporation of Buffalo, New York, of which he was President for five years.

J. C. Guilinger has been appointed Manager of the new Huntington Park District Office of the Los Angeles Gas & Electric Company. Mr. Guilinger has been with the company since 1903.

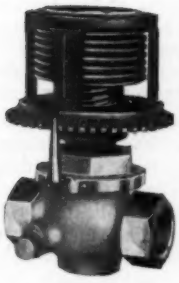
W. Howe Sadler, prominent Kentucky newspaper man, has joined the Kentucky Utilities Company, Louisville, Ky., as manager of the public information and advertising departments.

George H. Howard, president of the United Corporation, was elected a director of Public Service Corporation of New Jersey and underlying companies at a meeting of the board in Newark, recently. Mr. Howard replaces Samuel T. Bodine, who was one of the original directors of Public Service when it was organized in 1903.

Dale D. Merchant, superintendent of the Valparaiso district of the Northern Indiana Public Service Company, was named manager of that district.

(Perosnals continued on page 86)

Another ROBERTSHAW *Source of Extra Profit*



The ROBERTSHAW Space Heater THERMOSTAT

WHEREVER space heaters are used . . . either new or old . . . the Robertshaw Space Heater Thermostat will give you extra profits. It provides the economy of automatic control . . . just as essential in the gas fired space heater as in the gas range or the gas furnace.

The Robertshaw is small, compact, and attractively finished. Simple and durable, it is most easy to install at any time. And it is both automatic and ever dependable.

By adding this No. 2E Robertshaw to the space heater, the owner obtains that even, controlled heat which is such a vital safeguard of health and comfort. Be sure you know the attractive extra profits to be made with this much needed thermostat. Write today for the complete proposition.

ROBERTSHAW THERMOSTAT COMPANY
YOUNGWOOD, PENNA.

Walter E. Jominy, Research Engineer in charge of A. G. A. Metallurgical Projects at the University of Michigan, has resigned to become a member of the research staff of the A. O. Smith Corporation, Milwaukee, Wis. He entered upon his new duties January 15.

Mr, Jominy has carried on a number of important investigations for the Committee on Industrial Gas Research. These include metallurgical studies in the application of gas to forging, heat treating and short cycle malleabilizing. He has just finished some original and valuable work in the effect of atmospheres on the decarburization of steel at heat treating temperatures, which will be ready for publication soon.

Probably Mr. Jominy's most important contribution to the gas industry has been his findings on the relative importance, from the heating standpoint, of overheating, burning, decarburizing and scaling of steel forgings. Competent authorities state that his conclusions on these subjects will serve as a basis for the advanced design of gas forges for many years to come.

Most of the steel research work that Mr. Jominy has done for the Committee on Industrial Gas Research has been presented to industry through the American Society for Steel Treating and the technical press. This has given him a standing as one of the leading forging experts of the country. Prior to undertaking research work for the A. G. A. he had extensive experience in metallurgical work in the automobile industry with Packard, Ford and Studebaker.

W. P. Yant, of East Sparta, Ohio, has been appointed supervising engineer of the Pittsburgh Experiment Station of the United States Bureau of Mines, Department of Commerce. Mr. Yant succeeds G. St. J. Perrott, who has accepted a position on the research staff of the A. O. Smith Corporation, Milwaukee, Wis.

Mr. Yant graduated from the College of Wooster, Wooster, Ohio, in 1918. Immediately following graduation, he joined the staff of the Chemical Warfare Service at American University, Washington, D. C., and was assigned to work on the development of gas mask absorbents for war gases. Following the war, he was instructor in chemistry at the College of Wooster. He joined the gas laboratory staff of the United States Bureau of Mines in 1920 and was assigned to problems pertaining to mine, industrial, and fuel gases. In 1923 he was appointed chemist-in-charge of the Bureau's gas laboratory and in 1925 he became supervising chemist of the health laboratory section.

Some of the major investigations and problems in which Mr. Yant has been engaged since joining the Bureau of Mines are: The ventilation of the Holland Vehicular Tunnel, New York, and the Liberty Tunnels, Pittsburgh; the safe use of natural gas in domestic heating appliances; the physiological action of carbon monoxide and treatment for that type of poisoning; health hazards in the use of ethyl gasoline; health and safety in the petroleum industry; the composition of gases produced by low temperature carbonization of coal and the thermal decomposition of gaseous hydrocarbons; methods for the detection and analysis of mine gases and fuel gases; the effect of temperature and humidity on the comfort of workmen; the use of warning agents for detecting leakage of fuel gases; the toxicity and physiological action of a large number of mine and industrial gases and vapors; and the composition of drainage from coal mines and the effect of sealing worked-out or abandoned sections of mines in the composition of drainage.

Earl Hilburn, who has been in charge of the Georgia Natural Gas Corporation office at Milledgeville, Ga., since its opening several months ago, has been transferred to New Jersey, and his place has been taken by Mr. Sims.

S. H. Osterhoudt has been appointed general manager of the Union Gas & Electric Company, Bloomington, Ill., effective February 1. He succeeds R. J. Rutherford who resigned to take a new post in Massachusetts. Mr. Osterhoudt commenced his utility career with a gas company in Rome, New York, remaining there 14 years. For two years he was field representative of the Humphrey Water Heater Company of Kalamazoo, Mich., and since 1925 was superintendent of the plant of the Associated Gas & Electric System at Brewster, New York.

Leonard C. Habig, superintendent, Passaic District, gas distribution department of the Public Service Corp. of New Jersey completed twenty-five years of continuous service and received his gold button.

In December, 1905, Mr. Habig started as an office boy in the Street Department at the Front Street Gas Shop, Newark. He was promoted successively to the positions of time-clerk, record clerk, inspector and general foreman, all in Essex Division and on February 1, 1920, was made superintendent of the Passaic District.

Thomas H. Stephens, East Liverpool agent for The Manufacturers' Light & Heat Company, has been appointed district manager with supervision over 19 eastern Ohio, western Pennsylvania and West Virginia communities.

Mr. Stephens will divide his time between the East Liverpool and Steubenville offices.

Mr. Stephens entered the service of The Manufacturers' Light & Heat Company 30 years ago as cashier. He has been the East Liverpool agent for 18 years.

George W. Loeffel has been appointed manager of the house heating department of the Birmingham Gas Co. He succeeds Howard J. Bowman who has left for his home in New England.

Obituary

CLARK YOUNG McGOWN

Clark Young McGown, Engineer of Utilization, Consolidated Gas Company of New York, died on January 17, following a brief illness.

Mr. McGown, who was in his thirty-seventh year, had been connected with the company and its affiliated gas companies since May, 1922.

He graduated from Stevens Institute of Technology in 1916, and went to South America as assistant engineer in a sugar factory, returning to New York in 1918 to join the United States Ordinance Department. He served in several training camps during the World War, and was attending Officers Training Camp when the Armistice was declared.

In 1919, Mr. McGown returned to South America, this time as chief engineer for a group of small sugar factories. Upon his return in 1921, he was employed for a short time by the Western Electric Company.

He became shop superintendent for the Northern Union Gas Company in May, 1922.

He was transferred to the Consolidated Gas Company on April 1, 1929, as superintendent of the refrigeration, installation and maintenance department. On June 1st of the same year he was placed in charge of the central storage warehouse, and on October 1, he was promoted to Engineer of Utilization.

Mr. McGown was prominent in the affairs of the American Gas Association, and had a host of friends throughout the industry. He was a member of several engineering societies, including the Society of Gas Engineers, American Society of Mechanical Engineers, etc.

He is survived by his wife and two sons.

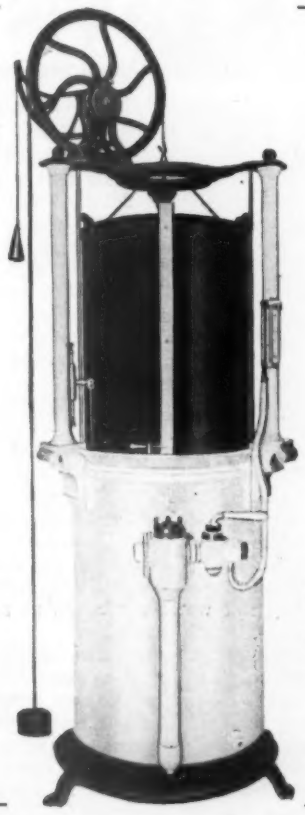
HAROLD EDWIN BORTON

Harold Edwin Borton, 49, assistant secretary-treasurer and assistant to the president of the Texas Power and Light company, died recently.

Mr. Borton was well known in Southwestern utility circles, being one time president of Southwestern Public Service association. He had been in the utility business for many years, his first connection being at Calvert, Tex.

SUPERIOR

Gas Meters
Provers
Service Cleaners
Diaphragms
Repairs



SUPERIOR METER CO.
167-41st Street
Brooklyn, N. Y.

BAROMETERS

PHILADELPHIA, THE WORKSHOP OF THE WORLD
has 14,000 Manufacturing Establishments of which many have World-Wide Reputations.

"PRINCO" STANDARD FORTIN MERCURIAL BAROMETERS

are in World-Wide use because they, too, have a "World-Wide Reputation"

THEY ARE GOOD BAROMETERS
THEY ARE REASONABLE IN PRICE

For more than a decade they have been made in such manner that they can be shipped safely and successfully wherever there is a common carrier. This has been recognized as an achievement in Barometry.

PRECISION THERMOMETER & INSTRUMENT COMPANY

1439 BRANDYWINE STREET - - - - - PHILADELPHIA, PA.

TRADE NEWS

United Engineers & Constructors, Inc.—Activities

Contract has been awarded by Rosslyn Gas Company, Rosslyn, Virginia, to install approximately 6950 feet of 3" welded steel main in and about Falls Church, Virginia.

Contract has been awarded by Alexandria Gas Company, Alexandria, Va., to furnish, deliver and install approximately five hundred and fifty ¾" services in Alexandria, Virginia.

Contract has been awarded by Washington Gas Light Company, Washington, D. C., to furnish, deliver and install 2060 feet of 12" welded steel main from West Station of Washington Gas Light Company to East Abutment of "K" Street Bridge, Washington, D. C.

Contract has been awarded by Georgetown Gas Light Company, Washington, D. C., to furnish, deliver, and install 940 feet of 12" welded steel main from East Abutment of "K" Street Bridge to 29th and "M" Sts., Washington, D. C.

Contract has been awarded by Alexandria Gas Company, Alexandria, Va., to furnish, deliver and install 7100 feet of 4" welded steel main and 27,700 feet of 3" welded steel main in Del Ray, Alexandria, Virginia.

Contract has been awarded by Jersey Central Power & Light Company, Asbury Park, N. J. to furnish, deliver and install at their plant at Belmar, N. J., one (1) 9'0" generator with linings, castings, changes to operating floor, as well as dismantling work connected with same.

The U. G. I. Heavy Oil Process is being placed into operation at the New Haven Gas Light Company's Plant.

Contract has been awarded by E. L. Phillips & Company of New York, for installation at the plant of the Queens Borough Gas & Electric Co., at Rockaway Park, N. Y., of a 9'0" I. D., U. G. I. Mechanical Generator Water Gas Set, with U. G. I. Model "B" Automatic Control Machine, and contract for installation at the plant of the Queens Borough Gas and Electric Company, at Rockaway Park, N. Y., for an 8-pass U. G. I. Haug high duty salt water condenser, as a duplicate to the existing unit.

Contract has been awarded by the New Haven Gas Light Company, New Haven, Conn., to furnish, deliver and install at the New Haven Plant, one (1) 450,000 cu. ft. per hour steam driven gas compressor, with foundations and auxiliary equipment.

Contract has been awarded by the Standard Oil Company of Louisiana, to furnish, deliver and install at Baton Rouge, La., a CO_2 Extraction Plant.

Cruse-Kemper Co. Awarded Contract for 10,000,000 Cu. Ft. Holder

Cruse-Kemper Co., Ambler, Pa., has been awarded contract for a ten million cu. ft. holder to be built for the Philadelphia Electric Company at West Conshohocken, Pa. The diameter of the holder is 265 feet and the total height about 250 feet. The foundation will be built on a cliff 90 feet higher than the gas plant so that the holder will be an outstanding landmark. It will require about 4400 tons of material to complete the job. The United Engineers & Constructors, Inc., will supervise the work.

General Refractories Co. Appoint Distributors

The General Refractories Company, of Philadelphia, Pa., announces the appointment of West Allis Fuel and Supply Company of West Allis, Wisconsin, as distributors of General Refractories Company Products. These distributors will operate in Milwaukee and Waukesha Counties, handling products manufactured in the Evens & Howard Division, St. Louis, Mo. The line includes the Acme and St. Louis brands of fire brick and Briklok high temperature mortar. They also will distribute Grefco Chrome base high temperature mortar and Grefco plastic chrome ore.

Cooper-Bessemer Corp. Receives Large Order for Gas Engine Compressors

An order for eleven 800-horsepower gas engine compressors, each capable of handling 21,000,000 cubic feet of natural gas daily, has been received by The Cooper-Bessemer Corporation from the Western Gas Company of El Paso, a subsidiary of the El Paso Natural Gas Company, according to B. B. Williams, president of the engine company. The total consideration was placed at $375,000.

Five of the new engines will be used on a $6,000,000 extension running from El Paso to Douglas and Bisbee, Ariz. and Cananea, Mexico via Deming, N. M. The line will be comprised of a 12-inch welded main good for 925 pounds of working pressure. One battery of three units will be placed on a present line near Fort Bliss, Texas and another group of like power will be installed north of Sieria Blanca, Texas.

On the new line, the engines will be placed at El Paso and Lordsburg, N. M., and will serve natural gas to the copper smelters of the Phelps-Dodge Corporation, the Calumet & Arizona Copper Company and the Greene-Cananea Copper Company a division of Anaconda. The pipes will be installed and ready for service June 1, under the direction of Bechtel & Kayser of San Francisco and the engineering organizations, Ford, Bacon & Davis and Stone & Webster.

The whole series of engines, known as twin tandem, double-acting, direct connected units, are of the same design as the 1000- and 1500-horsepower compressors built by The Cooper-Bessemer Corporation for a great number of natural gas lines in this country, Mr. Williams stated.

Stacey Engineering Co. Open Office in San Francisco

The Stacey Engineering Company, which includes The Connersville Blower Company, Inc., The P. H. & F. M. Roots Company, The Wilbraham-Green Blower Company and The Stacey Bros. Gas Construction Company, has opened a branch office at 235 Montgomery Street in the Russ Building, San Francisco, California.

Sales and service of blowers, pumps, meters, tanks, holders, purifiers and other products of the organization, are in charge of E. A. McCallum, who has been appointed District Manager.

The Linde Air Products Company Exhibit at National Western Metal & Machinery Exposition

The Linde Air Products Company, 30 East 42nd Street, New York, N. Y., will occupy Booth C-9 at the National Western Metal and Machinery Exposition, San Francisco, California, February 16 to 20. The feature of the exhibit will be the testing of welded steel coupons with the Oxweld Portable Tensile Testing Machine. Specimens of 50,000-lb. tensile strength steel plate, welded with Oxweld No. 1 High Test and Oxweld No. 21 High Strength Bronze Welding Rods, will be tested.

A complete line of Oxweld, Prest-O-Weld, and Purox equipment, which includes everything for oxwelding and cutting, and Prest-O-Lite Small Tank Appliances for heating and lighting will be exhibited. Specimens of Haynes Stellited machine tools will also be displayed.

Mr. C. S. Smith will be the representative in attendance.

(Trade News continued on page 90)

HYTEMPITE

is the universally used high temperature cement for Gas Plants, because it

—insures quick, economical repairs of Retorts, Jamb Joints, Furnace Walls, Arches and Baffles.

—can be used with salvaged, crushed old fire brick.

—not affected by heating and cooling of ovens.

—stands up under severe weather conditions.

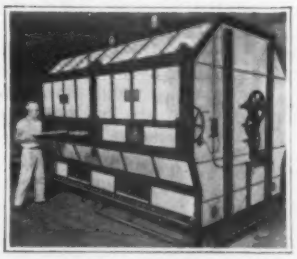
—makes thin, strong joint between tile or brick that stands up under extreme abrasive action of clinker tools.

—easily shot into place with Quigley Refractory Gun.

Keep a drum of HYTEMPITE in Retort House or Boiler Room for quick repairs.

QUIGLEY COMPANY INC.
INDUSTRIAL SPECIALTIES
56 West 45th Street, New York
Distributors with Stock and Service in every Industrial Center

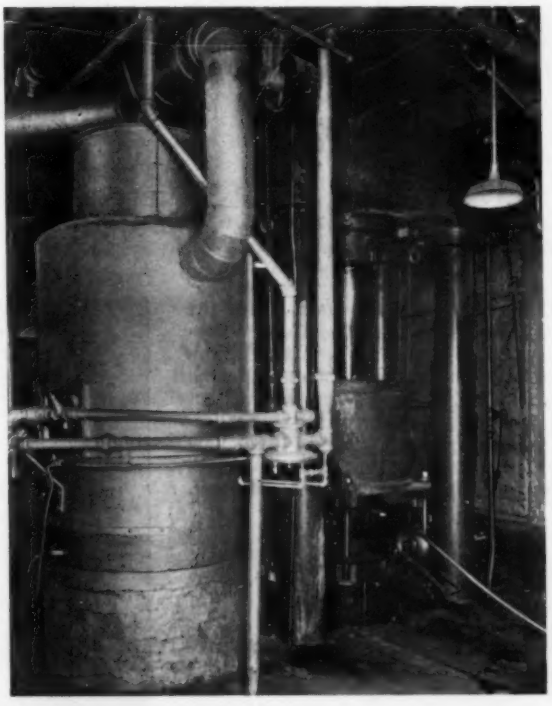
Bakers Make Good Gas Customers With This McDonald Made Meek Reel Oven



The bakers in your community all should be using gas as fuel. If they are not, perhaps it is because their ovens are not modern—not equipped to burn gas efficiently and economically. Every baker, once acquainted with the fuel economy of McDonald Made Meek Reel ovens is a live prospect for you. Write us for complete information on this modern baker's oven.

THE BRUCE McDONALD CO.
2015 WASHINGTON STREET
KANSAS CITY, MO.

PARTLOW
TEMPERATURE CONTROLS



In Making Cable Insulation

Control of Temperature Effects Many Savings

More and more this industry is relying on the unbeatable combination of controllable heat medium (gas or oil) and automatic regulation.

In the lead sheathing of cables Partlow Automatic Control Equipment insures at all times lead heated to the proper fluidity. Overheating or burning of the metal is impossible. Metal dross is reduced to a minimum. Because of the correct temperature of the lead, the formation of red lead oxide, so devastating as the cause of premature electrostatic break-down of the cable, is unknown. In addition Partlow Control Equipment insures faster production and uniformity of product.

May we mail you further information, or have one of our engineers call? No obligation. Write or wire.

The Partlow Corporation
New Hartford, N. Y.

PARTLOW
SAFETY GAS VALVE *and* PILOT

R. Fox Smith Joins the Central West Coal Company

Mr. R. Fox Smith, formerly sales manager of the W. H. Warner Company is now associated with The Central West Coal Company, Citizens Building, Cleveland, Ohio, in the capacity of Vice President. Mr. Smith will handle Lake, Rail and Industrial outputs for this company.

Charles G. Cooper Transferred to New York Office of Cooper-Bessemer Corp.

Charles G. Cooper, associated for the past three years with The Cooper-Bessemer Corporation at its Mt. Vernon, Ohio plant, has been transferred to the New York City offce where he will act as sales representative for the several divisions of the corporation. The New York office will continue under the management of C. M. Reagle, vice-president.

Announce Formation of Propane-Butane Contracting Corp.

C. M. Kemp Mfg. Company and associates have recently announced the formation of the Propane-Butane Contracting Corporation. This new organization is located at 405 East Oliver Street, Baltimore, Md. and will render such services as planning, supplying equipment for and building complete Butane Air-Gas Dilution Plants, planning, supplying equipment, arranging all contracts for and supervising the construction of complete Butane Air-Gas Dilution Plants and supplying equipment for Butane Air-Gas Dilution.

New Bulletin on Automatic Boiler Feed Water Units

A new bulletin just issued by Steam and Combustion Company, Chicago, announces a complete line of automatic boiler feed water units. The equipment consists of a condensate receiver tank fitted with make-up water control, a motor driven feed pump and water level control. The units are put out under the trade name SteCom, which is also used to designate the Company's line of gas fired high pressure boilers.

Standard SteCom feed water units are offered for boiler capacities from 5 to 215 horsepower, and for working pressures up to 125 lb. per square inch. A special feature of the SteCom unit is the telescoping receiver legs, by means of which the receiver tank height can be readily changed to meet varying head requirements.

A copy of SteCom bulletin No. 5, describing this equipment can be had by writing Steam and Combustion Company, 205 W. Wacker Drive, Chicago, Ill.

P. F. McEnaney, Eastern Manager for Stacey Manufacturing Co.

P. F. McEnaney has been appointed Eastern Sales Manager of Stacey Manufacturing Company, Cincinnati, Ohio.

P. F. McEnaney

George H. Cressler, General Sales Manager, formerly with headquarters in New York, has transferred his headquarters to the Cincinati office, where he will continue to direct the general sales plans of the company.

Mr. McEnaney has been a gas engineer and sales engineer for several years. He will have charge of gas holder sales and other work, with headquarters at 52 Vanderbilt Avenue, New York City.

New Catalog on Hays Combustion Meters

The Hays Corporation, Michigan City, Indiana, announces a new 24-page Catalog RA-31 covering Hays Combustion Meters for CO_2, Draft and Flue Gas Temperature and Hays Boiler Panels. This new piece of literature is generously illustrated with half tones and line drawings to clearly show mounting dimensions, method of installation, operating principle and general appearance of the equipment.

Catalog RA-31 will be sent on request.

New Worthington Pump & Machinery Catalog

The Worthington Pump & Machinery Company recently released the following bulletins and catalogs.

D-423-S4; Power Pumps, vertical triplex single-acting type, Fig. 1606, forged cylinders, pressure 1,000 to 10,000 lb.; 4 pages. Supersedes D-423-E1.

D-450-B1A; Deep Well Pumps, Axiflo, Hiflo, Coniflo; 32 pages. Supersedes D-450-B1. This bulletin contains installation and sectional views, directions for determining the alignment and water level of a deep well, useful tables and descriptions of the pumps.

D-711-S5; Power Vacuum Pumps, horizontal single double-acting; 4 pages. Supersedes D-92.

S-550-B2; Gas Engines, horizontal four-cycle double-acting, 36" stroke and over; 56 pages. Completely describes Worthington gas engines and gas compressors; useful pipeline tables, charts and formulas are added.

W-318-S2; Centrifugal Pumps, Type UA, two-stage volute; 4 pages.

W-318-S7; Centrifugal Pumps, Type UL, two-stage volute; 4 pages.

W-320-S1; Centrifugal Pumps, Underwriter fire pumps; 4 pages. Supersedes W-1074-B.

W-1200-B1; Worthington-Gilman rock drills and drill steel shop equipment; 4 pages.

Copies of these bulletins can be obtained upon application to the Publicity Department, Harrison, N. J.

Meriam Co. Builds 50% Extension to Factory

To keep pace with its steadily increasing business, the Meriam Co., 1955 West 112th St., Cleveland, Ohio, has now completed a 50% extension to its plant. The building is of the Truscon standardized type, and will house the welding department and storage; and will allow the entire space in the main building to be devoted to the manufacture and testing of the manometers, flow meters, draft gauges and shock absorbers which form the principal output of the Company.

This is the third increase in manufacturing space which the Meriam Co. has found necessary during the past four years.

Link-Belt Appoints New Crane-Shovel-Dragline Agent

Link-Belt Company, Chicago, announces the appointment of the McFarland Tractor & Equipment Co., St. Joseph, Mo., as their agent for the sale of Link-Belt cranes, shovels,, draglines, for the territory of Atchison and Doniphan countries in Kansas and the 17 counties in northwestern Missouri, around St. Joseph.

For Over Fifteen Years Kompak Has Remained Unchanged In Principle

The basic principle of a heating coil under the tank, with circulation carried to the top, not only gives a tank full of heated water during the heating period, but complete stratification during drawing, makes this tank full available at the faucet. Size for size, the KOMPAK has never been equaled in hot water service and economy.

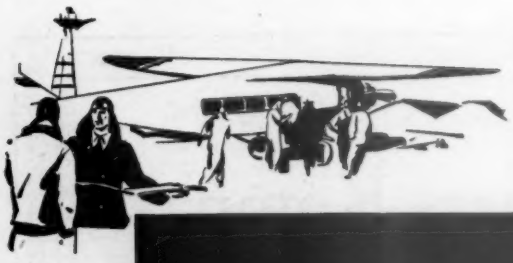
Combine this principle with exclusive Copper Construction, with the original and only automatic pilot, with the fuse plug shutoff, —

Is it any wonder that today Kompak is stronger than at any time in the history of gas water heating?

THE KOMPAK COMPANY,

New Brunswick, N. J.

KOMPAK
TRADE MARK



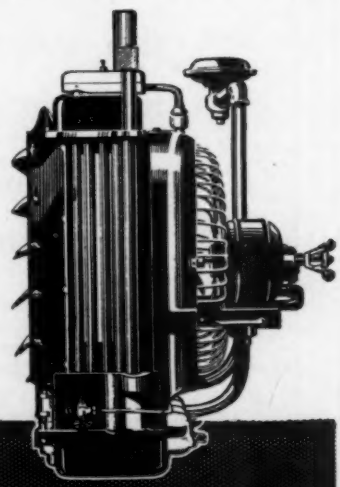
Dependable Heat for Daylight Factory Buildings

The fifteen Humphrey Gas Heaters installed in our daylight factory building, 50' x 350', ceiling 21' in center, 8½' glass on all sides, including skylight, heated the plant perfectly. With the exception of the extreme cold spell, it was only necessary to use five to seven heaters. We found the unit system economical and it created a substantial saving in our heating bills.

MERCURY AIRCRAFT CORP.,
By—R. H. Bickler, Treas. & Gen'l Mgr.

Humphrey Gas Unit Heaters are effectively used in a widely increasing variety of buildings. These structures vary from the daylight types such as the Mercury Aircraft Corp., shown above, with large window, skylight and area exposures, to stock rooms, foundries, printing plants, garages and stores.

Humphrey Gas Unit Heaters burn gas, the cleanest and most efficient fuel, and are automatic in operation when thermostatically controlled. Their use means many decided operating advantages—heat instantly available at any time, day or night—no personal supervision—no danger of freezing or problem of draining pipes as in steam or hot water installations—no fuel space needed.



Suspended from the ceiling, Humphrey Gas Unit Heaters circulate heated air at the most effective levels, keeping the temperature at the right degree for comfort and efficiency.

Another new and fertile field for the Humphrey dealer.

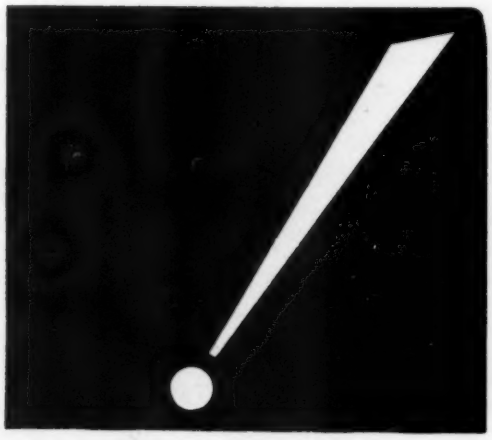
A HUMPHREY PRODUCT MADE BY

GENERAL GAS LIGHT COMPANY, KALAMAZOO, MICH.

NEW YORK SAN FRANCISCO PITTSBURGH CLEVELAND

The Humphrey *Gas* UNIT HEATER

"PATROL FLASH"

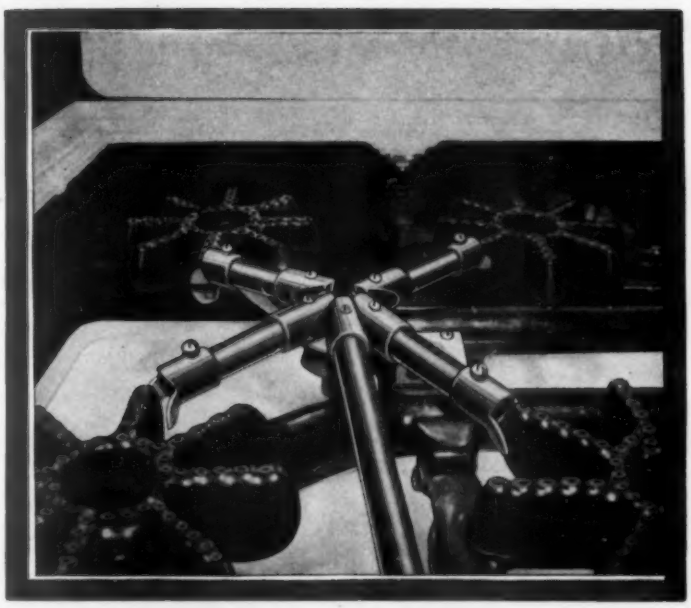


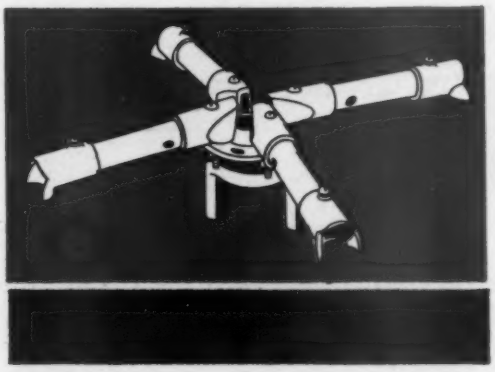
"PATROL-Flash" lighter for gas ranges is a sales feature — to sell gas ranges. There have been few improvements in the gas range with such immediate appeal to the customer.

Or so low in price.

Few with such interest compelling demonstration features — with so much to talk about. It is a convenience that delights the woman. Ask her.

She merely turns on the gas with one hand. The burner flashes aflame instantly. No other manipulation or operating tricks to learn.





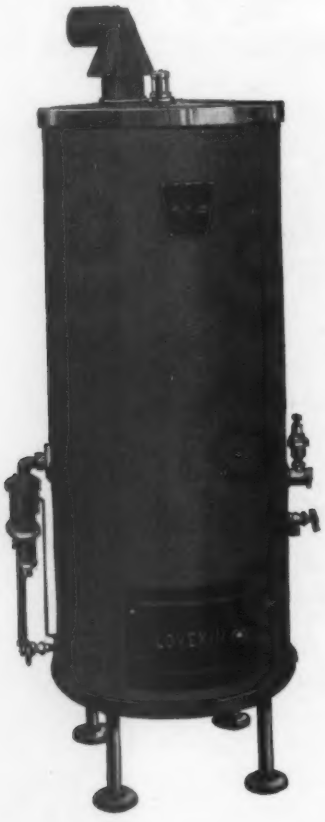
"Patrol-Flash" is thoroughly automatic. "Patrol-Flash" is pretty. Finish is dull nickel. A. G. A. approved on several ranges. It is a thoroughly "engineered" product—produced by well-known engineers in the gas appliance industry.

• • •

Extra tubes for simmer burner and oven lighting furnished with standard model "Patrol-Flash" lighter at slight additional cost.

THE PATROL VALVE COMPANY

Cor. Locust Ave. and W. 114th St. . Cleveland, Ohio



The President of one of the largest gas companies in the world, with the world's market from which to choose, has a Lovekin Gas Water Heater in his own home. And he paid for it, too.

LOVEKIN

Electrolux chosen for

New Bronx Apartments

WHAT a record for sales Electrolux has hung up in the Bronx—second largest borough of New York City!

During the first nine months of this year, 74 new apartments were built in the Bronx. Apartments ranging from 10 to 100 families apiece. And for 62 of these modern apartment buildings, Electrolux was the choice!

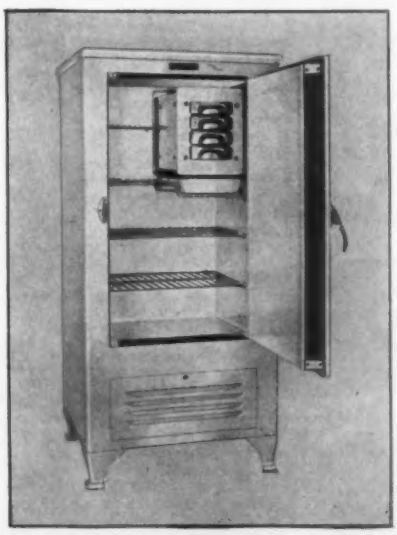
Not every community offers such industrious building projects as the Bronx. Yet every day you see apartment houses going up about you. Three or four a month, perhaps. Dwellings with 10, 20, 30 apartments apiece. Every one offering a ready market for Electrolux!

Suppose these apartments in your territory averaged only 20 apartments each. Every Electrolux installed would increase billing approximately 18 MCF yearly—or a total of 360 MCF for each apartment house!

Progressive gas companies have been quick to grasp the enormous load-building possibilities of Electrolux. Electrolux transforms small "convenience" accounts into permanently profitable accounts . . . builds up the off-hour load . . . creates new prestige for the gas industry.

Electrolux is the choice of tenants and apartment owners from coast to coast. Tenants prefer Electrolux because of its silence . . . its economy . . . its absolute dependability. Owners want the freedom from refrigeration complaint that Electrolux gives.

So don't wait. Write today for "Plan A"—a complete sales campaign to help you go after the profitable apartment market in your community. Electrolux Refrigerator Sales, Inc., Evansville, Ind.



THE KITCHENETTE—*one of the popular Electrolux models—adds approximately 1500 cu. ft. monthly to your domestic load.*

ELECTROLUX

THE *Gas* REFRIGERATOR

HEATING
BUNKER "C" OIL

for carburetting gas requires high pressure and high temperature.

ANDALE
BOWED TUBE
HEATERS

remain tight and are easily cleaned. These are the requirements for continuous satisfactory operation.

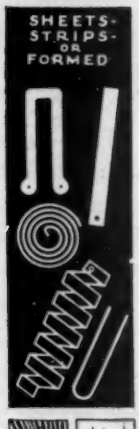
ANDALE COMPANY
1600 ARCH STREET
PHILADELPHIA

IS TEMPERATURE a FACTOR IN YOUR PRODUCT?

OFF! OFF! ON! OFF! ON! ON! OFF! OFF!

then CONTROL IT AUTOMATICALLY with

CHACE THERMOSTATIC METAL
"It Bends With the Heat"



Secure automatic temperature control by using Chace Thermostatic Metal (Bi-Metal) known by reputation for its high sensitivity, accuracy, uniformity and reliability. Obtainable in sheets, strips or formed to meet your requirements. 1200 degrees Fahrenheit without distortion. Used by many manufacturers of burners, heaters and automatically controlled safety devices. Consult our Engineering Department.

Manufactured by

W. M. CHACE VALVE CO.
1610 BEARD AVE. DETROIT, MICH.

TRADE CATALOGS

Published by manufacturers of Gas Equipment and Appliances for you. Order by number, using coupon on Page 104.

PLANT EQUIPMENT

A. B. C. SELF CLINKERING GENERATOR
The Western Gas Construction Co. 88
ADVANTAGES OF WELDED CONSTRUCTION
Western Gas Construction Co. 451
"AMERICAN" GAS AND METER TESTING APPARATUS
American Meter Co. 320
AUTOMATIC GOVERNORS
Connelly Iron Sponge & Governor Co. 289
BALANCE GOVERNORS
Connelly Iron Sponge & Governor Co. 290
BACK PRESSURE VALVES
Connelly Iron Sponge & Governor Co. 295
BECKER TYPE COMBUSTION COKE & GAS OVENS
The Koppers Construction Co. 235
BECKER TYPE BY-PRODUCT COKE AND GAS PLANTS
The Koppers Construction Co. 477
B. H. CO. THICKENER
The Bartlett Hayward Co. 56
B. H. CO. VERTICAL SCRUBBER
The Bartlett Hayward Co. 57
BOILER FEED PUMPS
P. M. Lattner Mfg. Co. 478
"BULLETS"—HOLDERS
Stacey Bros. Gas Construction Co. 516
BUTTERFLY VALVES
Western Gas Conctruction Co. 450
BUTANE PLANT EQUIPMENT
Philfuels Co. 510
CALORIMETRY
American Meter Co. 321
CALOROPTIC, THE
Connelly Iron Sponge & Governor Co. 511
CHEMICAL ANALYSIS OF GAS PURIFYING MATERIALS
E. J. Lavino & Co. 455
CHEMISTRY AND PHYSICS OF THE COMBUSTION OF GASEOUS FUELS
E. J. Lavino & Co. 456
COAL AND ASHES GATES
C. W. Hunt Co., Inc. 233
COAL PRODUCTS TREE
The Koppers Construction Co. 234
COKE FIRED GAS PRODUCER OPERATION
The Koppers Construction Co. 236
CONNELLY COMBINATION VALVE
Connelly Iron Sponge & Governor Co.
CONTINUOUS VERTICAL COMBINATION OVENS
The Koppers Construction Company 238
COOPER-BESSEMER NEW TYPE COMPRESSOR UNIT
Cooper-Bessemer Co. 517
COOPER-BESSEMER VERTICAL GAS ENGINES
Cooper-Bessemer Co. 518
COOPER-BESSEMER GAS AND OIL ENGINES
Cooper-Bessemer Co. 519
COOPER COMPRESSOR UNIT
Cooper Bessemer Co. 520
COUNTER BALANCE MANHOLES
Connelly Iron Sponge & Governor Co. 299
DE FLOREZ REMOTE MANUAL CONTROL SYSTEM
Brown Instrument Co. 452
DEHYDRATION OF MANUFACTURED GAS
The Koppers Construction Co. 237
DISTRICT L. C. GOVERNORS
Connelly Iron Sponge & Governor Co. 293
DR. OTT-LUX-GAS TESTER
The Alpha Lux Co., Inc. 23
DUPLEX VALVES
Andale Co. 45
PAST'S FLEXIPLE COUPLING
The Bartlett Hayward Co. 54
FORGED STEEL GATE VALVES
Darling Valve & Mfg. Co 20
FULTON DEAD WEIGHT SAFETY VALVES
Chaplin-Fulton Mfg. Co. 480
FULTON LEVER SAFETY VALVES
Chaplin-Fulton Mfg. Co. 470
GAS CONDENSERS
Isbell Porter Co. 140
GAS COOLER
Andale Co. 46
GAS DISTRIBUTION
The U. G. I. Contracting Co. 76
GAS ENGINE DRIVEN COMPRESSOR UNITS
Cooper-Bessemer Corpn. 503
GAS FILTERS
American Meter Co. 322
GAS MEASUREMENT
American Meter Co. 323
HAND COLORIMETER
The Alpha Lux Co. Inc. 22
HIGH EFFICIENCY GAS CONDENSERS
Isbell Porter Co. 137
HOWARD CHARGER
The Western Gas Construction Co. 37
HIGH TEST WELDING ROD
Union Carbide & Carbon Corpn. 255
INDUSTRIAL RAILWAY
C. W. Hunt Co., Inc. 230
JET PHOTOMETERS
Connelly Iron Sponge & Governor Co. 298
KEEPING UP WITH INDUSTRY
Cruse Kemper Co. 457
KENNEDY AUTOMATIC CONTROL
The Bartlett Hayward Co. 55
KOPPERS COMPANY'S COAL GAS PLANTS, THE
The Koppers Construction Co. 240
LABORATORY APPARATUS
American Meter Co. 324
Superior Meter Co. 521
LIQUID PURIFICATION
The Western Gas Construction Co. 83
LUX RECORDING GAUGE
The Alpha Lux Co., Inc. 21
MACKENZIE EXHAUSTERS
Isbell Porter Co. 141
MANUAL OF DRY BOX PURIFICATION
E. J. Lavino and Co. 276
MERCURY SEAL GOVERNORS
Connelly Iron Sponge & Governor Co. 291
METERS, GAS
American Meter Co. 326
Superior Meter Co. 522
"METRIC" IRONCASE METERS
American Meter Co. 325
MITCHELL ELECTRIC VIBRATING SCREENS
C. W. Hunt Co., Inc. 229
NAPHTHALENE ABSORPTION PLANTS
The Western Gas Construction Co. 84
NEW APPARATUS FOR THE REMOVAL OF NAPHTHALENE AND GUM FORMING CONSTITUENTS FROM GAS
The Koppers Construction Co. 242
NEW AND IMPROVED COOPER GAS ENGINE COMPRESSOR
Cooper Bessemer Corpn. 523
NEW METHODS OF GAS PURIFICATION
The Koppers Construction Co. 241
OBSERVATIONS ON LUX-MATERIAL
The Alpha Lux Co., Inc. 24
ORIFICE METERS
American Meter Co. 327
PIPE—TONCAN IRON
Republic Steel Corp. 454
PIVOTED BUCKET CONVEYORS
C. W. Hunt Co., Inc. 232
PRESSURE GAUGES
Connelly Iron Sponge & Governor Co. 296
American Meter Co. 378
Superior Meter Co. 525
PURIFICATION OF OPEN HEARTH FUEL GAS, THE
The Koppers Construction Co. 239
RELIANCE SERVICE REGULATORS
Isbell Porter Co. 139
ROADLESS BARROWS
Isbell Porter Co. 133
ROTARY SELF-CLEANING STRAINER
Andale Co. 47
SERVICE CLEANERS
American Meter Co. 329
Superior Meter Co. 521
SERVICE GOVERNORS
Connelly Iron Sponge & Governor Co. 292

(Continued on page 98)

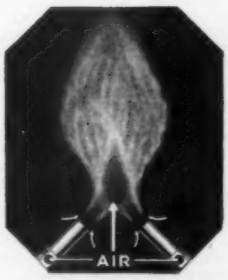
WHY

BARBER AUTOMATIC GAS BURNERS Are Most Economical

MOST of the reasons for BARBER economy are unique and outstanding. They are the result of new principles developed by BARBER engineers. They make for easier selling and for far more satisfactory heating by gas, the ideal fuel.

First, complete combustion of every heat unit in the gas, coupled with a much higher flame temperature than ordinary burners, because of the two flames impinging and fed with the required amount of air. Only BARBER has this super-combustion principle burner.

Second, the BARBER principle applies the flame with a "scrubbing" action directly to the heating surfaces at the proper level of furnace or boiler so that all the heat is delivered to registers or radiators, without waste.

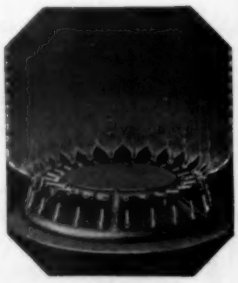


The super-hot BARBER twin-flame.

Third, the BARBER Gas Pressure Regulator which keeps the gas at an even, efficient pressure at the burners, thus preventing waste of gas.

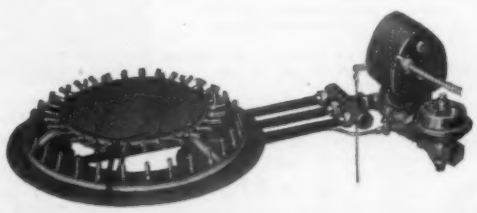
Last, the room thermostat which controls the burner operation to maintain the temperature you want, and so eliminates waste of gas through over-heating.

These make the cost of heating a home with gas compare favorably with the cost of coal. And with present low prices on fully Automatic BARBER Gas Burners, every medium size home in your community can afford to heat with gas.



The flames are applied directly against the heating surfaces.

Write for our catalogs and special sales literature. We shall be glad to co-operate with you to the fullest extent.



BARBER Automatic Gas Burner No. 330-B, with motor valve

The BARBER Gas Pressure Regulator is a reliable and accurate precision device.

BARBER *Automatic* JET GAS BURNERS

THE BARBER GAS BURNER CO., 3702 Superior Ave., Cleveland, Ohio

GROBLE
REGULATORS & GOVERNORS

Complete line of Regulators for

NATURAL
MANUFACTURED
BUTANE
PROPANE
GASES

HANDY INDICATOR for determining correct orifice size of service regulators according to inlet pressure mailed upon request.

GROBLE GAS REGULATOR COMPANY
Office and Factory—Anderson, Indiana

STOPPERS SINCE 1897

GOODMAN
Used since 1897
Improved Locking Sleeve
GAS MAIN STOPPER

STREET DEPARTMENT SUPPLIES

Goodman Stoppers
Goodman Cylindrical Stoppers
Gas Main Bags
Canvas-covered Bags
Inflating Bulbs
Pumps
Respirators
Krupa-Hendry Test Cap
Pressure Gauges,—portable and stationary
Gas Sampling Bags
Service Cleaners
Service Testers
Joint Runners
Calking Tools
Mittens and Gloves
Rubber Boots
Service Plugs, Rubber
Gas Main Plugs
Soft Wood Plugs
Pipe Cleaning Brushes
Soap Tape
Air-Line Masks
Packings

Safety Gas Main Stopper Co.
523 Atlantic Ave., Brooklyn, N. Y.

TRADE CATALOGS

(Continued from page 96)

SERVICE D. C. GOVERNORS
Connelly Iron Sponge & Governor Co. 294
SHAVING SCRUBBERS
Isbell Porter Co. 138
SKIP HOISTS
C. W. Hunt Co., Inc. 231
SMOOT CONTROL OF COMBUSTION — APPLIED TO TRAVELING GRATE STOKERS
Smoot Engineering Corpn. 60
SMOOT CONTROL AS APPLIED TO UNDERFEED STOKERS
Smoot Engineering Corpn. 67
SMOOT CONTROL AS APPLIED TO WATER GAS SETS
Smoot Engineering Corpn. 68
SMOOT STEAM ACCUMULATOR AND CONTROL SYSTEM
Smoot Engineering Corpn. 66
SPECIFICATIONS ON HIGH AND LOW PRESSURE HOLDERS
The Stacey Bros. Gas Constrn. Co. 74
"STACEY BULLET"
The Stacey Bros. Gas Constrn. Co. 73
STREET DEPARTMENT TOOLS
Connelly Iron Sponge & Governor Co. 297
STREET MAIN GOVERNORS
Isbell Porter Co. 134
THROTTLE GOVERNORS & COMPENSATORS
Isbell Porter Co. 142
U. G. I. BARRING DOWN MACHINE, THE
The U. G. I. Contracting Co. 77
U. G. I. INTERMITTENT CHAMBER OVENS
The U. G. I. Contracting Co. 75
U. G. I. MECHANICAL GENERATOR AND CHARGER, THE
The U. G. I. Contracting Co. 79
U. G. I. MODEL "B" AUTOMATIC CONTROL, THE
The U. G. I. Contracting Co. 78
VALVES
The Western Gas Construction Co. 86
VALVES & SPECIALS
Isbell Porter Co. 144
VALVES
Darling Valve & Mfg. Co. 35
VERTICAL GAS ENGINES
Cooper-Bessemer Corpn. 504
WATER GAS
The Western Gas Construction Co. 89
WATERLESS GAS HOLDERS
The Bartlett Haynard Co. 58
WEST GAS
West Gas Improvement Co. 175
POSITIVE PRESSURE BLOWERS
The Connersville Blower Co. 61
PUMPS FOR GAS PLANTS
Geo. D. Roper Corpn. 481
ROOTS ACME GAS PUMPS
The P. H. & F. M. Roots Co. 212
ROOTS ACME GAS PUMP INSTRUCTIONS AND PARTS LIST
The P. H. & F. M. Roots Co. 211
ROOTS GAS PUMP INSTRUCTIONS AND PARTS LISTS
The P. H. & F. M. Roots Co. 213
ROOTS POSITIVE DISPLACEMENT METER
The P. H. & F. M. Roots Co. 209
ROTARY DISPLACEMENT METERS
The Connersville Blower Co. 59
ROOTS ROLLER BEARING GAS PUMPS
P. H. & F. M. Roots Mfg. Co. 425
ROOTS ROLLER BEARING BLOWERS, STANDARD DUTY, HEAVY DUTY
P. H. & F. M. Roots Co. 453
STANDARD DUTY GAS PUMP CONSTRUCTION
The P. H. & F. M. Roots Co. 216
STANDARD HOLDERS FOR LOW PRESSURE STORAGE
Stacey Mfg. Co. 424
HIGH PRESSURE GAS HOLDERS
Stacey Mfg. Co. 425

INSTRUMENTS

BRISTOL'S AIR OPERATED CONTROLLERS
The Bristol Co. 127
BRISTOL'S AUTOMATIC ELECTRIC CONTROL VALVES
The Bristol Co. 126
BROWN AUTOMATIC TEMPERATURE CONTROL CATALOG
The Brown Instrument Co. 166
BROWN ELECTRIC FLOW METER CATALOG
The Brown Instrument Co. 176
BROWN REMOTE TYPE INSTRUMENTS
Brown Instrument Co. 427
BRISTOL AUTOMATIC TEMPERATURE CONTROL CATALOG ON GAS FIRED BAKING OVENS
Bristol Co. 498
BRISTOL'S LONG DISTANCE TRANSMITTING GAUGES
The Bristol Co. 129
BRISTOL'S PYROMETERS
The Bristol Co. 130
BROWN PYROMETER CATALOG
The Brown Instrument Co. 171
BRISTOLS PYROMETER CONTROLLERS
The Bristol Co. 123
BRISTOLS RECORDING BAROMETERS
The Bristol Co. 125
BRISTOL'S RECORDING LIQUID LEVEL GAUGES
The Bristol Co. 128
BRISTOL'S RECORDING MILLIVOLTMETERS FOR ELECTROLYSIS SURVEYS
The Bristol Co. 127
BRISTOL'S RECORDING PRESSURE & VACUUM GAUGES
The Bristol Co. 131
BRISTOL RECORDING PSYCHROMETERS
The Bristol Co. 308
BRISTOL'S TEMPERATURE CONTROLLERS
The Bristol Co. 124
BRISTOL'S RECORDING THERMOMETERS
The Bristol Company 132
THE ERA OF AUTOMATIC CONTROL
Brown Instrument Co. 502
"GOOD FURNACES—GOOD MEN—YET WE'RE SUNK ON OUR HEAT TREATING COSTS"
Brown Instrument Co. 550
MEETING YOUR IDEAS ON THE FLOW PROBLEM
The Brown Instrument Co. 164
PARTLOW TEMPERATURE CONTROLS
Partlow Corpn. 482
PRESSURE GAUGE CATALOG
The Brown Instrument Co. 169
RECORDING DEMAND FOR GAS METERS
American Meter Co. 330
RECORDING THERMOMETERS CATALOG
The Brown Instrument Co. 168
RESISTANCE THERMOMETERS CATALOG
The Brown Instrument Co. 167
TYCOS INSTRUMENTS FOR GAS PLANTS
Taylor Instrument Companies 542

REGULATORS

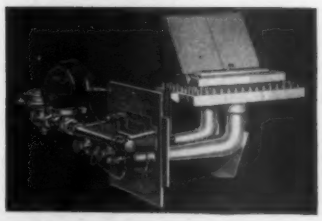
AUTOMATIC GAS BURNING EQUIPMENT
Partlow Corpn. 470
AUTOMATIC TEMPERATURE CONTROLS
Partlow Corpn. 471
AUTOMATIC TEMPERATURE INDICATING CONTACTOR
Partlow Corpn. 472
AUTOMATIC TRUCK-CLOSING ANTI-VACUUM VALVE
Reynolds Gas Regulator Co. 282
BOTTLED GAS AN ALLY OF THE GAS INDUSTRY
Sprague Meter Co. 306
FULTON GAS FUEL BOILER GOVERNOR
The Chaplin Fulton Mfg. Co. 248
FULTON GAS REGULATOR CATALOGUE
The Chaplin Fulton Mfg. Co. 247
HIGH PRESSURE LINE REGULATORS AND HIGH PRESSURE RELIEF VALVES
Reynolds Gas Regulator Co. 278
HIGH PRESSURE SERVICE REGULATORS
Reynolds Gas Regulator Co. 270
LINOTYPE AND MONOTYPE TEMPERATURE CONTROL
Partlow Corpn. 473
LITTLE GIANT HOUSE REGULATOR
Reynolds Gas Regulator Co. 283
LOW PRESSURE SERVICE REGULATORS
Reynolds Gas Regulator Co. 281
METAL MELTING POT TEMPERATURE CONTROL CIRCULAR
Partlow Corpn. 474
METER HANGER CATALOG
Mueller Co. 2

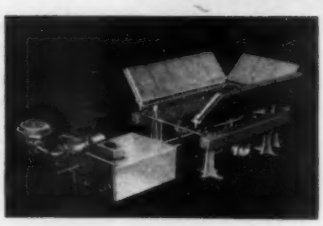
(Continued on page 100)

TYPE "X-2"

TYPE "X-2-S"

TYPE "R"





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For Every Size . . . Furnace or Boiler

As your salesmen canvass for house-heating prospects, they never need pass up a home because it is too large or too small for a conversion burner installation — or because the furnace or boiler is of the wrong type.

JANITROL is made in a variety of types and sizes, providing an unusually wide range of application to all furnaces and boilers.

More than 150 Gas Companies have adopted JANITROL because of its wide adaptability . . . also because it makes and holds many new customers and paves the way for the future installation of a gas designed furnace or boiler.

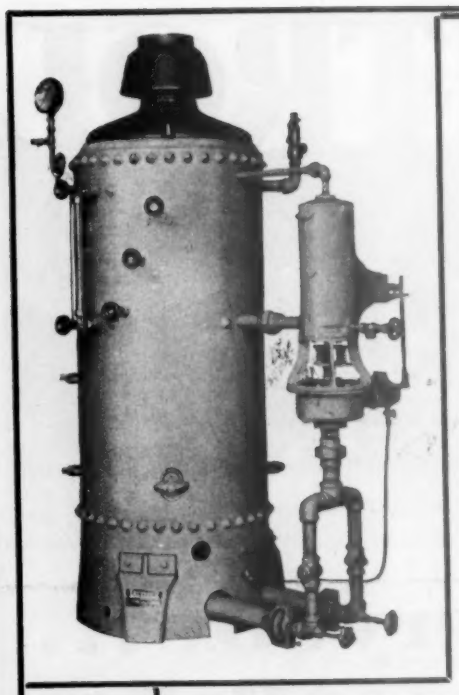
Approximately 30,000 JANITROL installations have been made under varying conditions, and have received both public and Gas Company acceptance.

There is a JANITROL Representative in your territory ready to assist you in merchandising and selling JANITROL. Our Advertising Department will provide many merchandising helps, to fit YOUR particular needs. Let us help you increase your house-heating load with JANITROL.

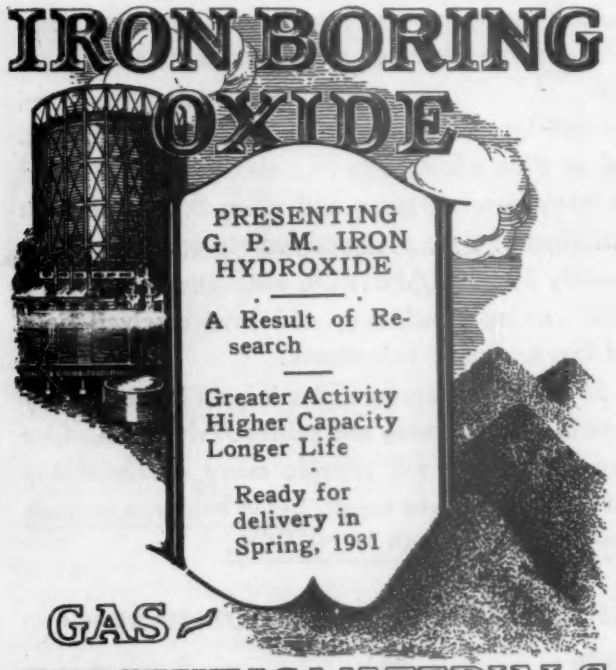
›› SUBSIDIARY OF HENRY L. DOHERTY & COMPANY ‹‹

Surface Combustion

Surface Combustion Corporation, Toledo, Ohio — Sales & Engineering Service in Principal Cities



P. M. LATTNER MFG. CO.
Cedar Rapids, Iowa



TRADE CATALOGS

(Continued from page 98)

PERFORMANCE IS PROOF
Groble Gas Regulator Co. 175

POCKET HAND BOOK—DIRECTIONS FOR SETTING AND OPERATING FULTON GAS REGULATORS
The Chaplin Fulton Mfg. Co. 249

REGULATOR CATALOG
Mueller Co. 3

REGULATOR CATALOG
Reynolds Gas Regulator Co. 37

REGULATORS FOR HIGH & MEDIUM PRESSURES
Sprague Meter Co. 225

RELIANCE BALANCE VALVE DISTRICT REGULATOR
Isbell Porter Co. 139

SINGLE DISTRICT & DOUBLE DISTRICT REGULATORS
Isbell Porter Co. 136
Reynolds Gas Regulator Co. 280

SAFETY GAS VALVE AND PILOT WITH LOW WATER SHUT OFF
Partlow Corpn. 475

SINGLE- DOUBLE- AND QUADRUPLET SAFETY GAS VALVE AND PILOT
Partlow Corpn. 476

REFRACTORIES

CEMENTING JAMP JOINTS
Quigley Company 159

CHOOSING A HIGH TEMPERATURE CEMENT
Quigley Company 158

HIGH TEMPERATURE CEMENT IN THE GAS PLANT
Quigley Company 160

HOT PATCHING RETORTS
Quigley Company 163

HYTEMPITE IN THE GAS PLANT
Quigley Company 408

HYTEMPITE IN THE POWER PLANT
Quigley Company 161

PROTECT YOUR PLANT & EQUIPMENT —A PROTECTIVE COATING
Quigley Company 458

PROPERTIES AND USES OF KROMEPATCH
E. J. Lavino & Co. 157

QUICK CARBURETOR REPAIRS MADE HYTEMPITE
Quigley Company 162

QUIGLEY REFRACTORY GUN, THE
Quigley Company 310

QUIGLEY ACID PROOF CEMENT
Quigley Company 409

BETTER BOILER BRICK WORK & MONOLITHIC CONSTRUCTION
Refractory and Engineering Corp. 410

R & E STIC-TITE MONOLITE CEMENT FOR HEAT INSULATION
Refractory and Engineering Corp.

PIPE

AUTOGENOUS WELDING OF NATIONAL PIPE
National Tube Co. 411

CAST IRON PIPE
United States Cast Iron Pipe & Foundry Co. 140

CAST IRON PIPE & FITTINGS
McWane Cast Iron Pipe Co. 203

COUPLINGS AND SPECIALTIES FOR NATURAL GAS
S. R. Dresser Mfg. Co. 41

COUPLINGS FOR MANUFACTURED GAS MAINS
S. R. Dresser Mfg. Co. 42

FOR EVERY JOINT ON THE LINE
Victaulic Co. of Amer. 13

WESTLING VALVE
Bartlett Hayward Co. 275

WOODALL-DUCKHAM VERTICAL RETORTS
Isbell Porter Co. 141

PIPE CATALOG, GENERAL
McWane Cast Iron Pipe Co. 483

SMALL PIPE CATALOG
McWane Cast Iron Pipe Co. 484

HANDBOOK OF CAST IRON PIPE (DISTRIBUTED TO GAS OFFICIALS AND ENGINEERS ONLY)
Cast Iron Pipe Research Assn. 178

HANDBOOK OF CAST IRON PIPE FOR GAS SERVICE
United States Cast Iron Pipe & Foundry Co. 148

HANDBOOK OF DE LAVAUD CENTRIFUGALLY CAST IRON PIPE
United States Cast Iron Pipe and Foundry Co. 144

BLOWERS

CONNERSVILLE GAS EXHAUSTERS, BOOSTERS AND METERS
The Connersville Blower Co. 60

CONNERSVILLE POSITIVE PRESSURE BLOWER
The Connersville Blower Co. 332

CONNERSVILLE CYCLOIDAL PUMPS
The Connersville Blower Co. 333

COVERS INDUSTRY LIKE A BLANKET
The P. H. & M. M. Roots Co. 218

PIPE (Coatings, Couplings, Joints, Welding Equipment)

JOINTS ON DE LAVAUD CAST IRON PIPE FOR GAS SERVICE
United States Cast Iron Pipe and Foundry Co. 147

"FOR EVERY JOINT ON THE LINE"
Victaulic Co. 499

PIPE COUPLINGS
Victaulic Co. of Amer. 14

STEEL PIPE COUPLINGS
S. R. Dresser Mfg. Co. 41

STREET DEPARTMENT SUPPLIES
Safety Gas Main Stopper Co. 261

FIELD DIRECTIONS FOR APPLYING "OR AN OPENING UNDER THAT STREET YOU CAN'T BARRICADE
Armco Culvert Mfg. Assn. 500

BITUMASTIC ENAMEL
Wailes Dove-Hermiston Corpn. 201

HIGH TEST WELDING ROD
The Linde Air Products Co. 82

JOINT SEALING COMPOUND
Quigley Company, Inc. 485

LONG PIPE LINES WITH OXWELDED JOINTS
The Linde Air Products Co. 81

MILE AFTER MILE
Wailes Dove-Hermiston Corpn. 200

OXWELD
The Linde Air Products Co. 83

OXY-ACETYLENE TIPS
The Linde Air Products Co. 80

PROTECTION FOR SERVICES AND OTHER SMALL DIAMETER PIPE
Wailes Dove-Hermiston Corpn. 199

PROTECTION OF OIL & GAS LINES
Wailes Dove-Hermiston Corpn. 334

ARMCO CULVERTS AND DRAINAGE PRODUCTS
Armco Culvert Mfrs. Assn. 414

REDUCING THE COST OF CULVERT PLACEMENT
Armco Culvert Mfrs. Assn. 415

METERS

APPARATUS BULLETINS
American Meter Co. 119

CAST IRON GAS METERS
Sprague Meter Co. 284

DISPLACEMENT AND ORIFICE MEASUREMENT

EMCO STANDARD DOMESTIC AND CURB BOX METERS
Pittsburgh Equitable Meter 416

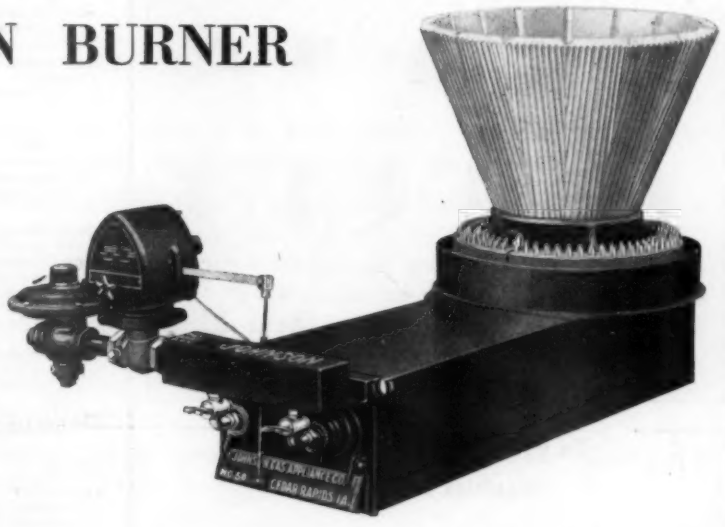
EMCO TIN METER
Pittsburgh Equitable Meter Co. 269

(Continued on page 102)

JOHNSON

CONVERSION BURNER

Considered from a dealer or user standpoint—the most desirable gas home-heating burner made. To the user it offers dependability, safety and efficiency in a maximum degree; and to the dealer it offers these same advantages as selling points. Dependability cuts down service costs. Satisfied users will create new prospects. A sixteen-page brochure tells the whole story—write for it.



JOHNSON GAS APPLIANCE CO.
Cedar Rapids JOHNSON PATENTED DIRECT JET **IOWA**

BIG ONES OR LITTLE ONES
-A COMPLETE LINE OF DEPENDABLE

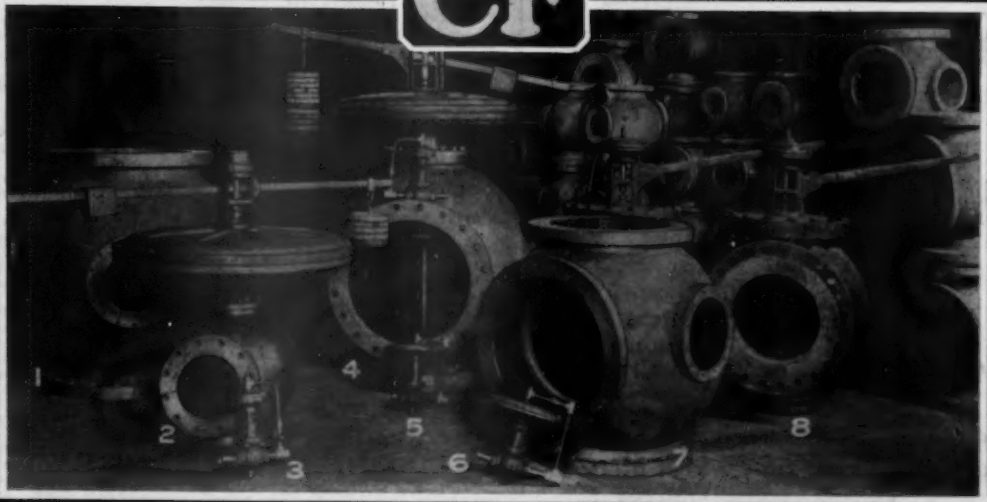
CF

1 BODY FOR TWENTY-FOUR-INCH LOW PRESSURE REGULATOR.

2 A TEN-INCH DIFFERENTIAL REGULATOR.

3 A THREE-FOURTHS INCH HIGH PRESSURE REGULATOR.

4 TWENTY-FOUR-INCH DIFFERENTIAL REGULATOR FOR MIXING GASES.



5 ONE-INCH HOUSE REGULATOR.

6 ONE AND ONE-HALF INCH HOUSE REGULATOR.

7 BODY OF A TWENTY-INCH WEIGHTED ILLUMINATING REGULATOR.

8 A SIXTEEN-INCH HIGH PRESSURE REGULATOR.

REGULATORS

GREATER dependability and accuracy has been the Chaplin-Fulton goal for over forty years of experience in controlling gas pressure. Being today's standard is the result of ceaseless effort to improve design, materials, and workmanship.

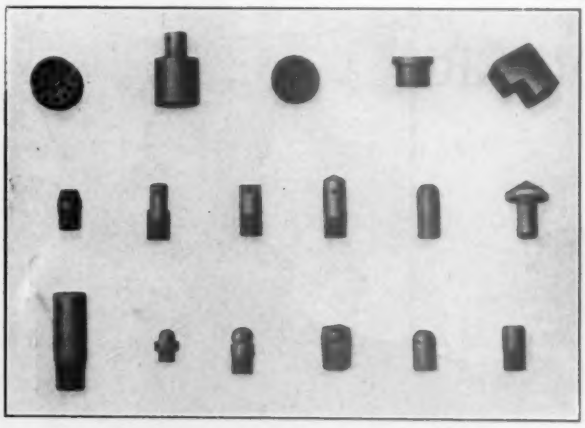
During this time there have been developed many varying types of regulators—enough to meet every major requirement of gas control. Chaplin-Fulton therefore represents a most complete and a highly dependable line of products. Catalogues are available which describe each Regulator.

The Chaplin-Fulton Mfg. Company

ORGANIZED 1884 — OLDEST BUILDERS OF GAS REGULATORS IN THE COUNTRY. BUILT IN ALL SIZES, FROM 1 INCH TO 24 INCHES; FOR ALL SERVICES, 1 OZ. UP TO 2,000 LBS. PRESSURE TO SQUARE INCH

28-40 Penn Avenue, Pittsburgh, Pa.

LAVA PILOTS



To your individual design
Inquiries solicited

AMERICAN LAVA CORPORATION

29-59 William St., Chattanooga, Tennessee

Manufacturers of Heat Resistant Insulators

LEADING GAS COMPANIES USE LAMBERT METERS

All sizes up to 3,400 cu. ft. capacity

Meters
Diaphragms
Repairs
Provers
Pumps
Calorimeters
Wet Meters
Gauges
Apparatus

LAMBERT METER CO.
BUSH TERM. BLDG. 4, BROOKLYN, N. Y.

TRADE CATALOGS

(Continued from page 100)

EMCO NO. 5 LARGE CAPACITY PRESSED STEEL GAS METER
Pittsburgh Equitable Meter Co. 267
EMCO DEMAND METER
Pittsburgh Equitable Meter Co. 268
EMCO LARGE CAPACITY POSITIVE GAS METERS
Pittsburgh Equitable Meter Co. 266
MONEL WET TYPE METERS
Superior Meter Co. 223
INSTRUCTIONS FOR CONNERSVILLE TANDEM METERS
The Connersville Blower Co. 337
INSTRUCTION FOR THE INSTALLATION AND OPERATION OF CONNERSVILLE ROTARY DISPLACEMENT METERS
Connersville Blower Co. 341
INSTRUCTIONS FOR THE MAXIMUM DEMAND RECORDER
The Connersville Blower Co. 336
INSTRUCTIONS FOR THE USE OF THE P. U. T. T. RECORDING GAUGE
The Connersville Blower Co. 342
IRONCLAD CAST IRON DRY GAS METER
Pittsburgh Equitable Meter Co. 264
DREADNAUGHT TYPE METERS
Sprague Meter Co. 227
GAS METERS AND APPARATUS
Lambert Meter Co., Inc. 173
American Meter Co. 338
Superior Meter Co. 527
INSTRUCTIONS FOR THE PROVING AND TESTING OF METERS
American Meter Co. 120
Superior Meter Co. 528
LINDERMAN LARGE VOLUME GAS METERS
American Meter Co. 339
METER CATALOG
American Meter Co. 121
METERS AND DIAPHRAGMS
Superior Meter Co. 224
"METRIC" FLOW METERS
American Meter Co. 343
RECORDING DEMAND FLOW METER
Lambert Meter Co. 175
DEMAND GAS METERS
Bulletin 13—Sprague Meter Co. 305
"WESTCOTT" ORIFICE METERS
American Meter Co. 344
SPRAGUE LINE OF LOW PRESSURE REGULATORS
Sprague Meter Co. 488
RECHROME AND OILED METER LEATHERS
Besse Osborne & Odell 570

MISCELLANEOUS

CLEVELAND TRENCHERS
Cleveland Trencher Co. 417
ADJUSTABLE CYLINDER METER HANGERS
Mueller Co. 489
CLEANING COMPOUND ANNITE
Quigley Co., Inc. 490
BITUMEN HEATERS
Mohawk Asphalt Heater Co. 571
LEAD & COMPOUND MELTING FURNACES
Mohawk Asphalt Heater Co. 572
PIPE DIPPING TROUGHS
Mohawk Asphalt Heater Co. 573
OIL BURNING TORCHES
Mohawk Asphalt Heater Co. 574
COMBINATION TOOL ASPHALT & SURFACE HEATERS
Mohawk Asphalt Heater Co. 575
MOHAWK HI-SPEED TRADER TOOL CHART
Mohawk Asphalt Heater Co. 576
MOHAWK HI-SPEED UTILITY TRAILERS, 2 AND 4 WHEEL
Mohawk Asphalt Heater Co. 577
CORK DIPPING PANS
Mohawk Asphalt Heater Co. 578

Gas Appliances

INCINERATION

INCINERATOR SALES MANUAL
Kernit Incinerator Co. 360
YOUR NEXT MOVE
Kernit Incinerator Co. 361
A GOLDEN OPPORTUNITY IN YOUR HAND
Kernit Incinerator Co. 362
SALESMEN'S CATALOG SHEET
Kernit Incinerator Co. 150
SAID ONE NEIGHBOR TO ANOTHER
Kernit Incinerator Co. 151
MODERN DISPOSAL OF WASTE
Kernit Incinerator Co. 152
ARCHITECTS AND BUILDERS FOLDER
Kernit Incinerator Co. 156

INDUSTRIAL EQUIPMENT

AIR HEATER BULLETIN
Surface Combustion Co. 505
RIVET HEATERS
Surface Combustion Co. 506
POTATO CHIP FURNACES
Surface Combustion Co. 507
LAVA TIPS FOR INDUSTRIAL GAS BURNERS
American Lava Corpn. 486
AUTOMATIC BOILER FEED SYSTEMS
P. M. Latimer Mfg. Co. 287
FURNACES, TORCHES, BURNERS FOR HEATING, SOLDERING, METAL-MELTING, HEAT TREATING
Johnson Gas Appliance Co. 526
GAS FIRED HIGH PRESSURE BOILERS
P. M. Latimer Mfg. Co. 286
PROFITABLE BAKING
Bruce McDonald Co. 39
THE RED DEVIL OVEN
Bruce McDonald Co. 38
LINOTYPE TEMPERATURE CONTROL
Robertshaw Thermostat Co. 418
LAVA FOR MECHANICAL AND ELECTRICAL PURPOSES
American Lava Corpn. 487
MANTLE RECUPERATORS
Surface Combustion Co. 515
NEW PROCESS OF NITRIDING
Surface Combustion Co. 508
MONOTYPE TEMPERATURE CONTROL
Robertshaw Thermostat Co. 419
METAL MELTING POT TEMPERATURE CONTROLLER
Robertshaw Thermostat Co. 420
MOTION IN BAKING
Bruce McDonald Co. 501
JOHNSON DIRECT JET FURNACES AND APPLIANCES
Johnson Gas Appliance Co. 554
THERMOSTATIC HEAT CONTROL FOR COFFEE URNS AND STEAM TABLES
Johnson Gas Appliance Co. 530
JOHNSON INDUSTRIAL GAS APPLIANCES
Johnson Gas Appliance Co. 531

HOUSE HEATING

ARCHITECT'S CATALOG
American Gas Products Corpn. 246
AUTOMATIC UNIFORM HEAT
Roberts-Gordon Appliances Corpn. 551
BOILER TRADE CATALOG
American Gas Products Corpn. 245
BOILER CONSUMER CATALOG
American Gas Products Corpn. 244
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Barber Gas Burner Co. 469
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Roberts-Gordon Appliances Corpn. 552
HEAT WITH GAS
Franklin Gas Appliance Co. 4
HOMESTEAD FIRES
The Homestead Heater Co. 19
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HOUSE HEATING CATALOG
Surface Combustion Co. 509
IDEAL GAS BOILER HANDBOOK
American Gas Products Corpn. 243
NEW JOHNSON CONVERSION BURNER
Johnson Gas Appliance Co. 532
SALES ALBUM
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(Continued on page 104)

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George D. Roper Co. 48
MERCHANDISING GAS APPLIANCES TO THE HOUSEWIFE
Geo. D. Roper Corpn. 49
RANGE CATALOG
Geo. D. Roper Corpn. 51
RANGE CATALOG
New Process Stove Co. 260
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Dangler Stove Co. 261
RANGE CATALOG—ORIOLE GAS RANGES
Standard Gas Equipment Corpn. 346
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THE UTILITY
CONSTANT HOT WATER
Welsbach Co. 72
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Kompak Co. 263
WARM FRIENDS (RADIANT GAS HEATERS)
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Humphrey Co. 274
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Inertol Co. 363
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   2. Tilting type

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   2. Tilting type
   3. Rotary type with metal crucible

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D. Special melting furnaces.
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   3. Reverberatory furnaces for high temperature melting and reducing
   4. Monometer for refining, alloying, and dross recovery.

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   3. Double deck.

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D. Special furnaces
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Bartlett Hayward Co. .....Front Cover & 30
Besse, Osborn & Odell 17
Brown Instrument Company 18
Byllesby Engineering & Management Corp. ... 104

Cast Iron Pipe Research Assn. 8-9
Chace Valve Co., W. M. 96
Chaplin-Fulton Mfg. Co. 101
Cleveland Trencher Co., The 25
Connelly Iron Sponge & Governor Co. 107
Connersville Blower Co. 106
Cruse Kemper Co. 7

Darling Valve & Mfg. Co. 26
Dieterle, Edward A. 107
Dresser, S. R., Mfg. Co. 21

Electrolux Refrigerator Sales, Inc. 95

Gas Engineering Co. 106
Gas Machinery Co. 10
Gas Purifying Materials Co. 100
General Gas Light Co. 92
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Homestead Heater Co. 106
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Hunt, C. W., Co., Inc. 104

Improved Equipment—Russell Engr. Co. 106
Isbell Porter Co. 105

Johnson Gas Appliance Co. 101

Kitson Company 27
Kompak Company 91

Lambert Meter Co. 102
Lattner Mfg. Co., P. M. 100
Lavino & Co., E. J. 19, 106
Linde Air Products Co. 22
Lovekin Water Heater Co. 94

McClintic-Marshall Co. 105
McDonald Co., Bruce 89
McWane Cast Iron Pipe Co. 29
Mears-Kane-Ofeldt, Inc. 103
Mohawk Asphalt Heater Co. 103

National Tube Co. 81

Partlow Corp., The 89
Patrol Valve Co. 93
Philfuels Company 15
Pittsburgh Equitable Meter Co. ..Inside Back Cover
Precision Thermometer & Instrument Co. 87

Quigley Co. 89

Republic Steel Corpn. 14
Reynolds Gas Regulator Co. 28
Roberts-Gordon Appliance Corpn. 65-66
Robertshaw Thermostat Co. 85
Roots Co., P. H. & F. M. 106

Safety Gas Main Stopper Co. 98
Schmidt & Co., L. D. 107
Semet-Solvay Engineering Corp. 5
Smoot Engineering Co. 6
Sprague Meter Co. 16
Stacey Engineering Co. (Holder Div.) 11
Stacey Bro. Gas Construction Co. 11
Stacey Engineering Co. (Blower Div.) 106
Stacey Manufacturing Co. 4
Superior Meter Co. 87
Surface Combustion Corporation 99

Taylor Instrument Company 20

Unger, John S. 106
Union Carbide & Carbon Corp. 22
United Engineers & Constructors, Inc. 63
United States Pipe & Foundry Co. ....Back Cover

Victaulic Co., of America 23

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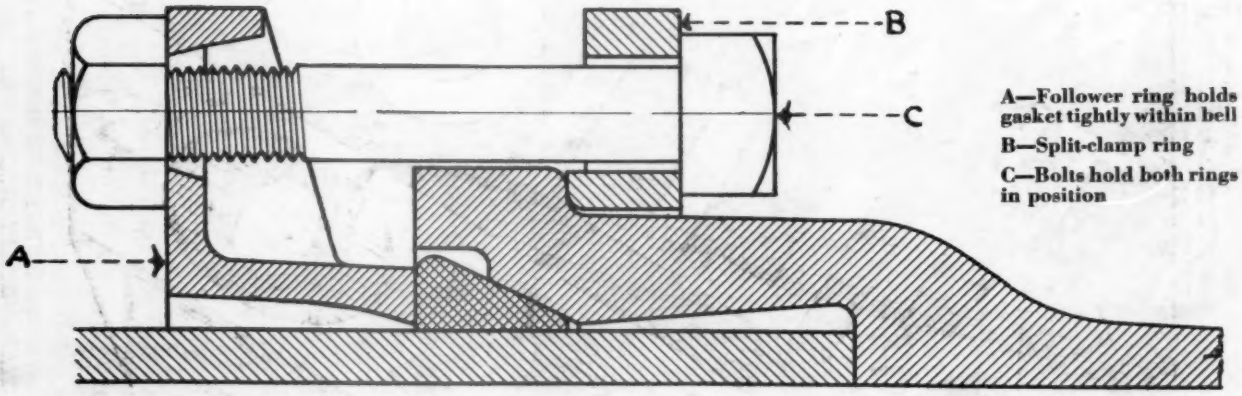

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